VOLUME LI NUMBER FOUR

The NATIONAL GEOGRAPHIC MAGAZINE

APRIL, 1927

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ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

TO further the important study of solar radiation in relation to long-range weather forecasting, The Society has appropriated $60,000 to enable the Smithsonian Institution to establish a station for four years on Mt. Brukkaros, in South-west Africa.

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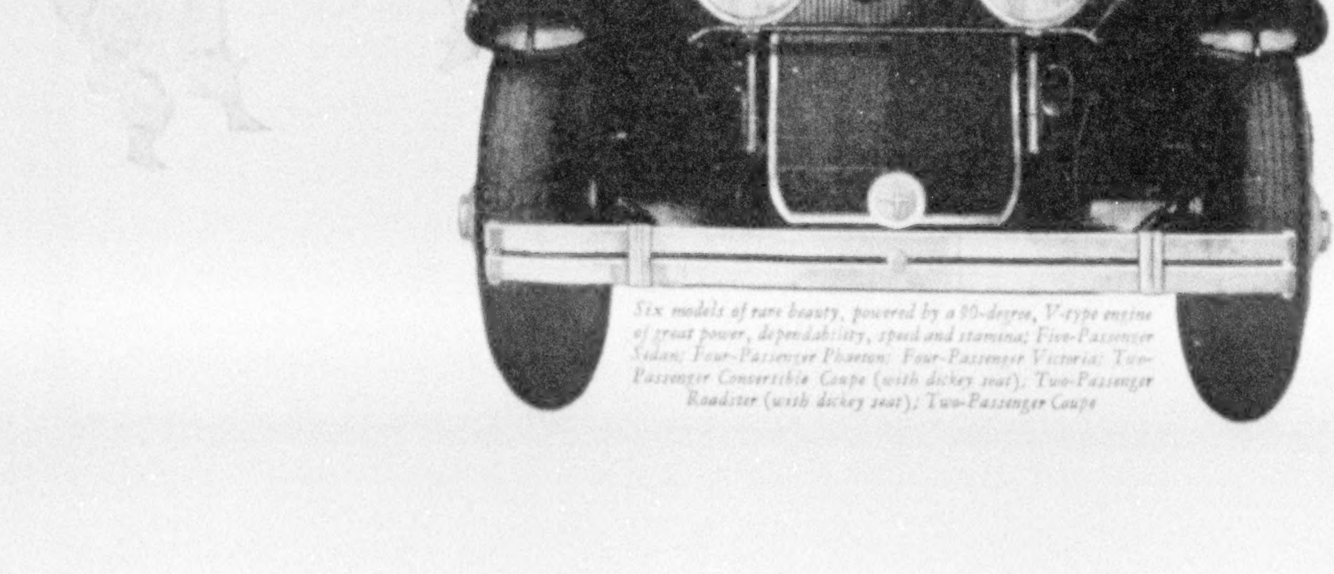
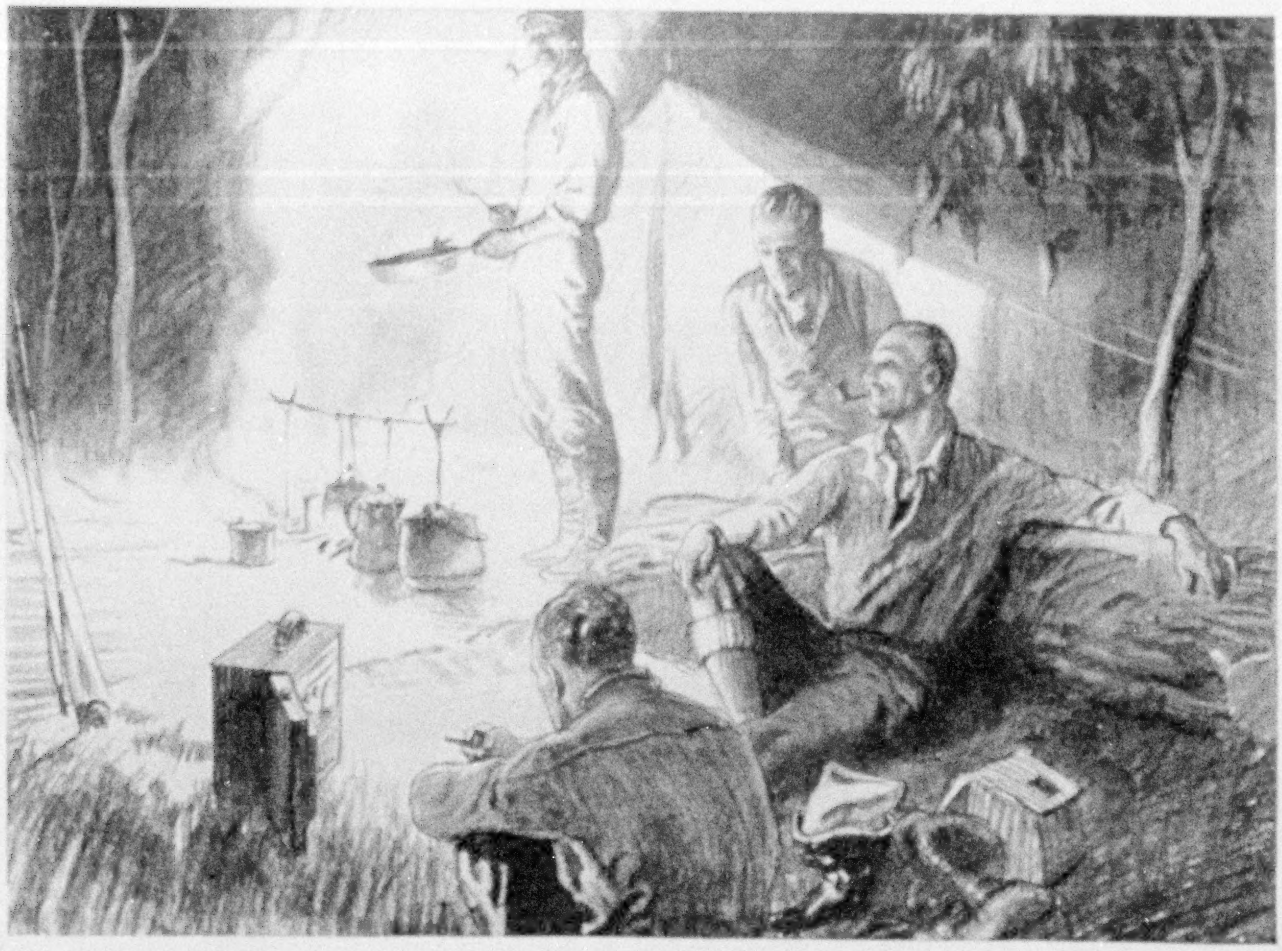


Six models of rare beauty, powered by a 90-degree, V-type engine of great power, dependability, speed and stamina; Five-Passenger Sedan; Four-Passenger Phaeton; Four-Passenger Victoria; Two-Passenger Convertible Coupe (with dickey seat); Two-Passenger Roadster (with dickey seat); Two-Passenger Coupe



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WITH the outdoor days coming—the picnics and camp trips and tours—get a Radiola 26, that can forget it's a home set, and change in a moment to a portable, to carry the music and the sports news with you!

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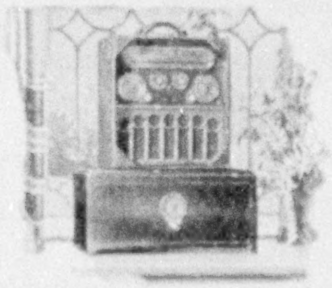

Radiola 26, with six Radiotrons. Finished in walnut; with a matching cabinet to hold home batteries or battery eliminators, and to make possible an antenna, if you wish one. $225.

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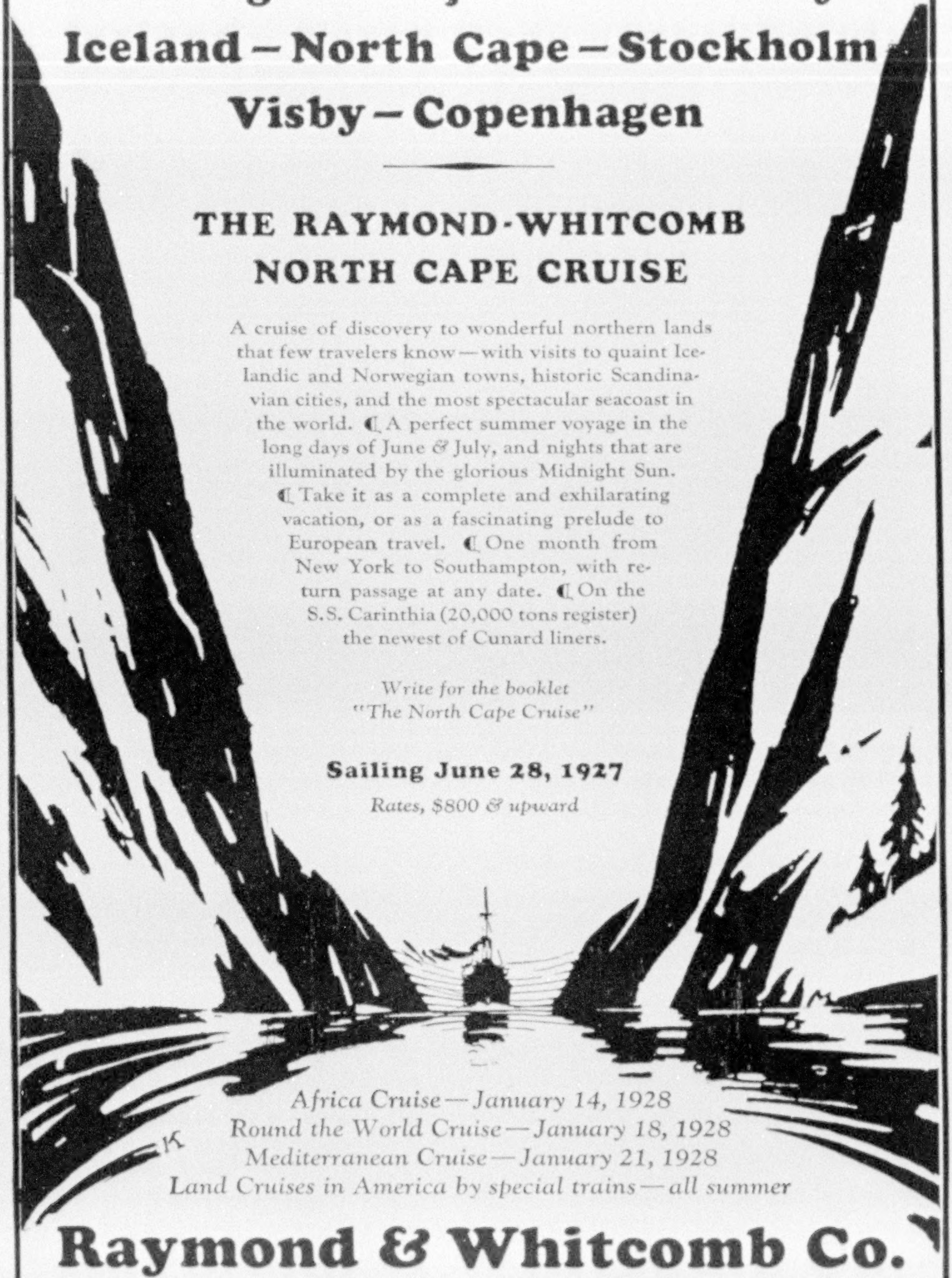

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In your pocket, perhaps, nestles the watch that ticked in time to your heartbeats as a nervous bridegroom, a proud young father. You cherish this watch, but when you display it in public, it often puts a false appraisal upon you. Viewed by critical eyes, it is anything but an honest reflection of your business and social position. So why not know now the pride that ever comes from the ownership of a modern Elgin. It is an investment you will never regret . . . an investment in good taste, authentic design, unhurried craftsmanship.

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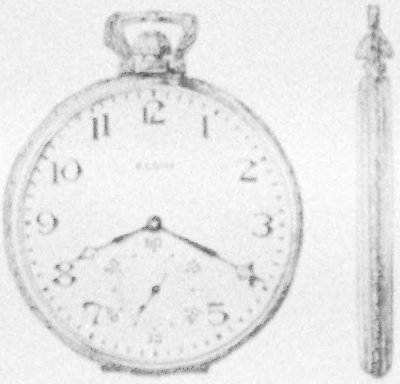

THE WOMAN'S WRIST WATCH is encased in 18-karat solid white gold, set with diamonds, and priced at . . . . . . $150.

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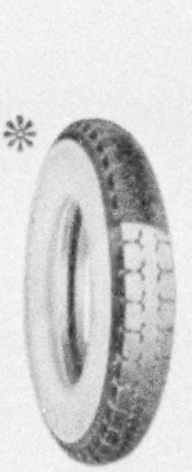

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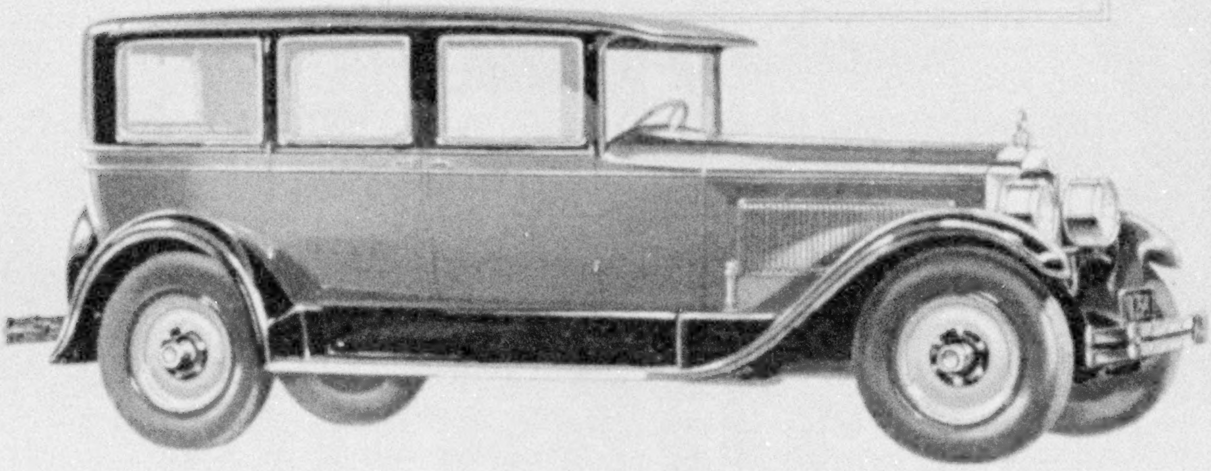

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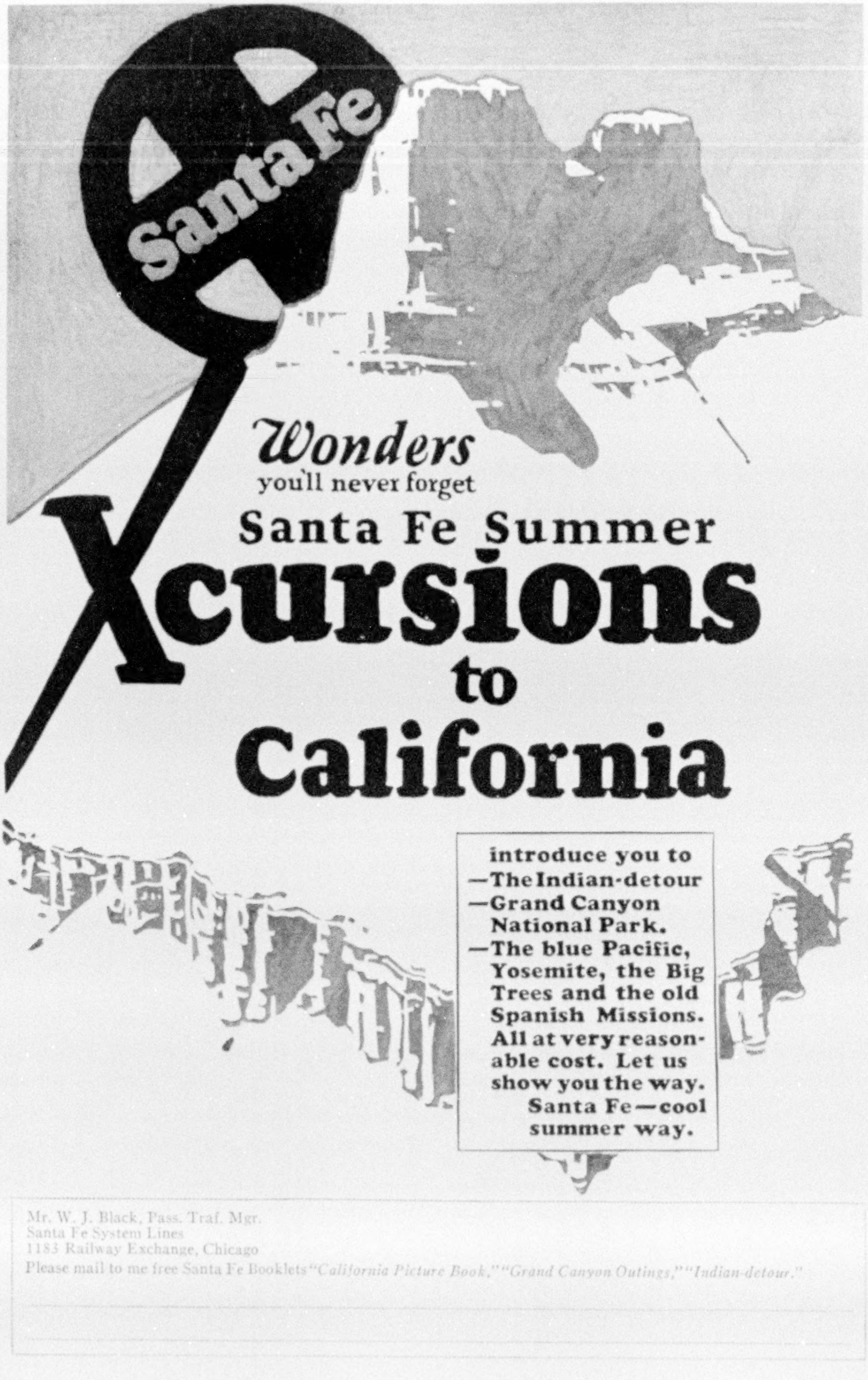
ASK THE MAN WHO OWNS ONE

PACKARD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an Engine that is Vibrationless Beyond Belief

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BUICK MOTOR COMPANY, Flint, Mich. *Division of General Motors Corporation*

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MOTOR CARS

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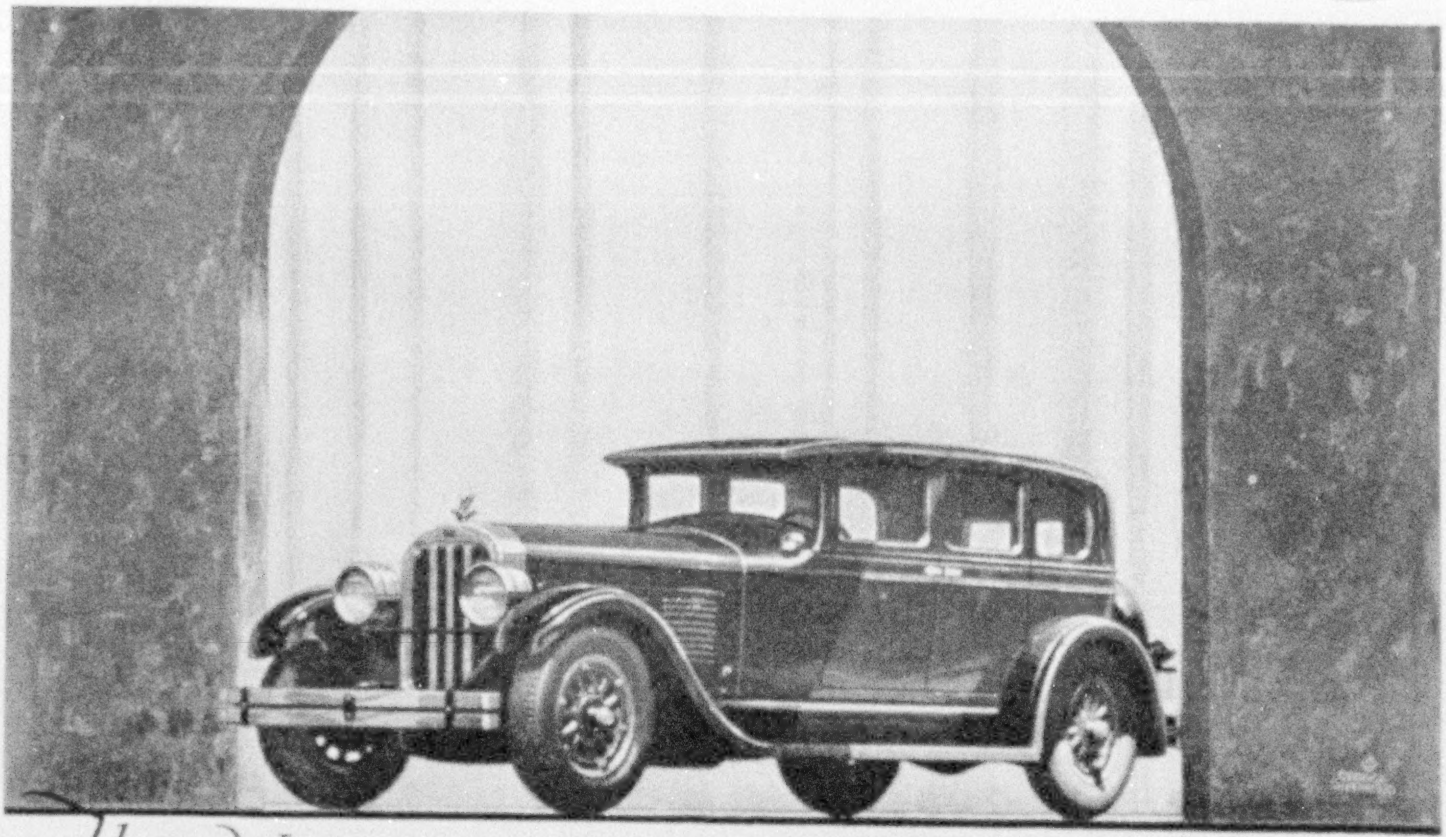

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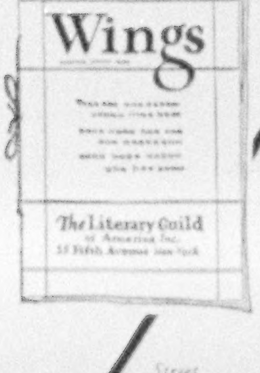

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World Cruise

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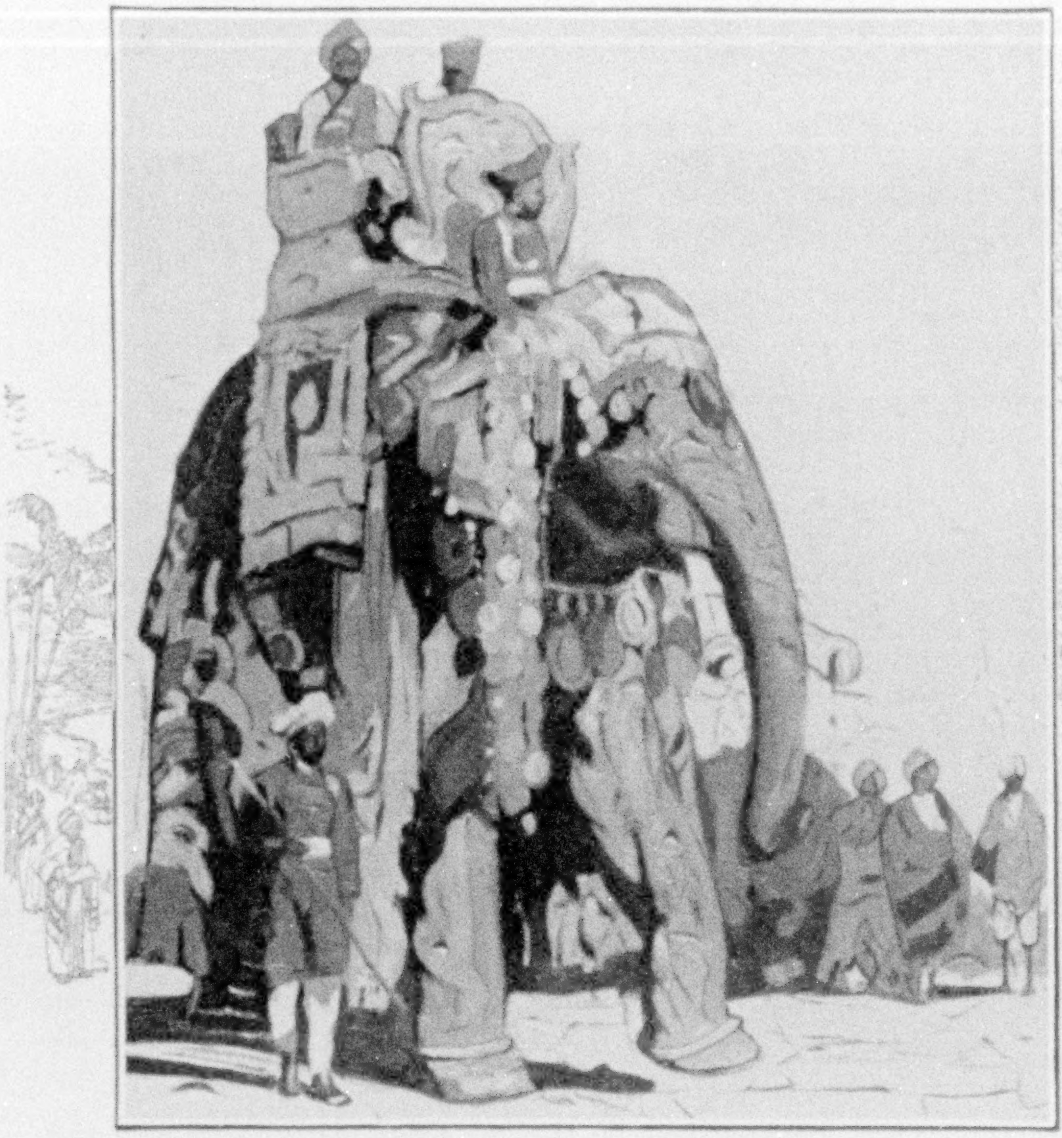

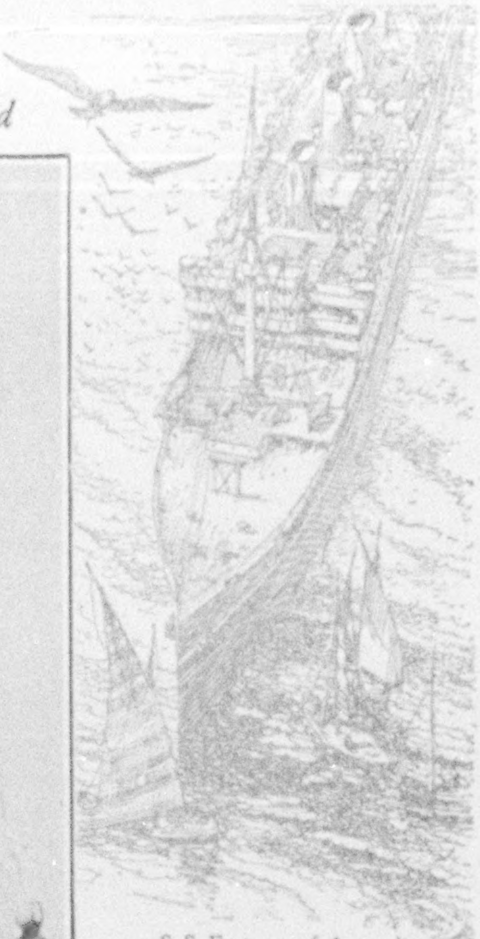

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Because of 40 years—*this wonder-belt cruise*

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In 19 countries, you are an honored guest. You are extended best accommodations. You are accorded special privileges.

Throughout 133 days, a delightful cuisine. Your service is Canadian Pacific standard. Your companionship congenial.

40 years has it taken Canadian Pacific to build this way of seeing the world's wonders. First, it spanned America with railroads and hotels. Then, it criss-crossed the Pacific with services and bridged the Atlantic with ships. It placed its own agents in the world's ports, and trained its own cruise staff. Because 39 such years have gone before, this World Cruise is possible.

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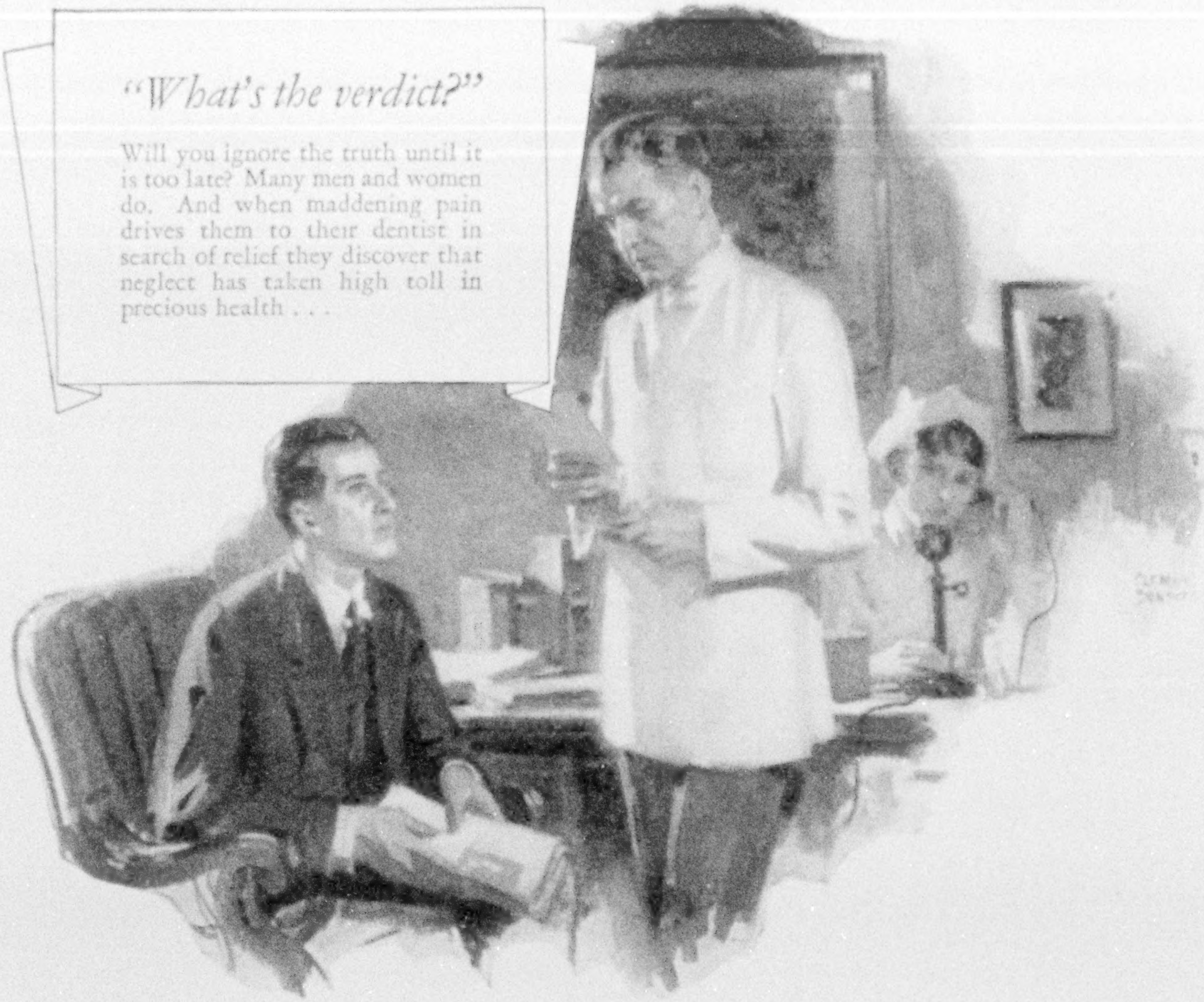

4 Out of 5 Invite Dread Pyorrhea

If let alone, Pyorrhea reaps a rich harvest. Its poison forming in pockets at the base of the teeth ravages the system, threatens good health and often causes such serious ills as rheumatism, neuritis and anemia.

It marks 4 persons out of 5 past 40 and thousands younger. These uneven odds can be bettered.

You can safeguard good health and keep your teeth and gums sound by practising these simple preventive measures. Have your dentist make a thorough examination of teeth and gums at least twice a year. And start using Forhan's for the Gums, now.

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It firms gum tissue and keeps teeth white and free from acids which cause decay.

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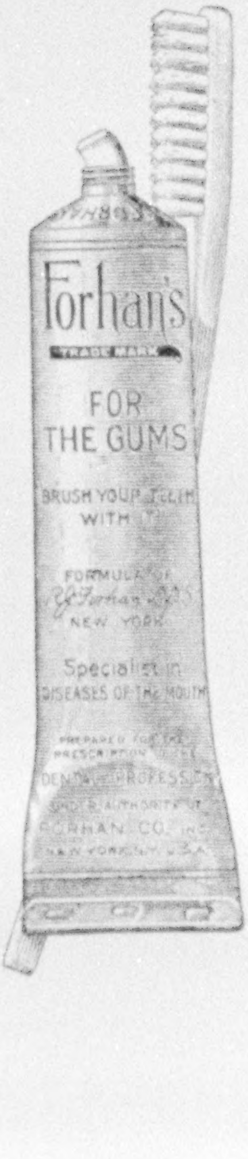
FOR THE GUMS



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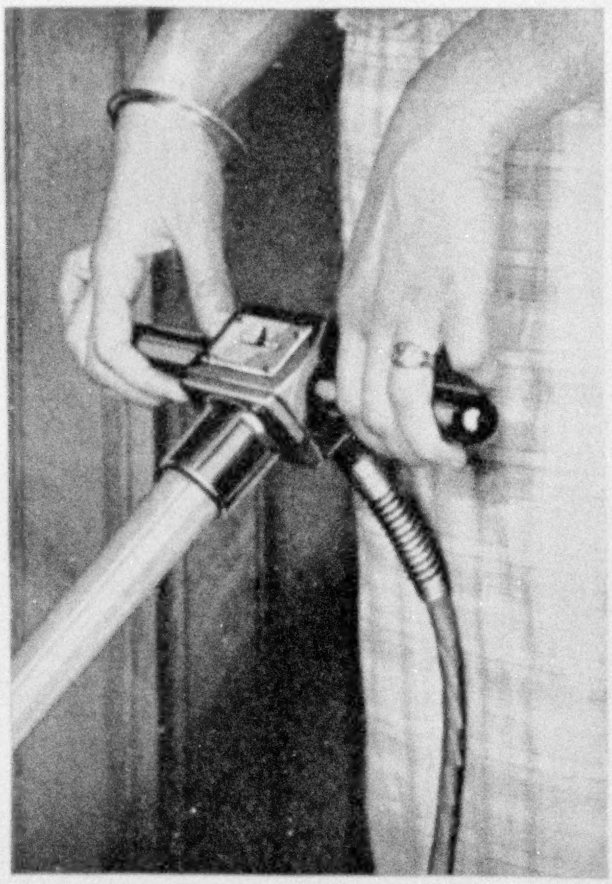

New Floors *for a* Few Dollars

Household electric machine scrapes, refinishes, waxes, and scrubs.

A NEW and extremely easy way of caring for floors is here offered you. It is radically different from anything in your experience. It is the application of electric power and mechanical genius to an old, old problem of the home.

New floors and old—both show amazing improvement.

Five Astonishing Results

The Ponsell Electric Floor Machine brings you five important benefits.

First, it removes from a wood floor all the hardened dirt, the old shellac or varnish. Once more you see the lovely surface of the wood itself.

Second, it sandpapers the surface to a texture of satin. A skilled carpenter working many hours could not make that surface smoother.

Third, it rubs wax into the wood. It rubs with a speed and vigor impossible to attain by hand. Thus, by friction, the wax warms, spreads evenly over the entire surface, goes 100% farther.

Fourth, it polishes—and how it polishes! Your floor gleams with a surpassing luster, assumes a mellow natural glow, glistening on in spite of dust and footsteps. And refinishing only needs to be done ONCE! All that is necessary afterward is a few minutes waxing and polishing once in awhile—an operation that the machine makes absurdly easy. Then your floors *always* look as though they had been refinished the day before.

Fifth, the machine scrubs such floors as need scrubbing. Thus it cleans them thoroughly, more thoroughly perhaps than they have ever before been cleaned.

Floors of All Kinds

The Ponsell Floor Machine takes care of *all* your floors. It gives linoleum a lustre surpassing anything you have ever known . . . a surface so immaculately smooth that dust and dirt have a hard time sticking to it. The Ponsell scrubs tile, cement, or any other kind of floors as they never could be scrubbed by hand, and without the least splashing.

With the machine it is ridiculously easy. No skill is necessary, no great strength or energy. The Ponsell is easier to operate than a vacuum cleaner. You do not push or pull it—you simply guide it. In a few minutes eight-year-old children have become expert in its operation.

This one machine, by means of interchangeable brushes and blocks, performs five different jobs—it scrapes, sandpapers, waxes, polishes, and scrubs.

Our greatest argument is the machine's actual performance. You owe it to yourself to see a demonstration. You owe it to your home to learn more of this wonderful machine. Use the coupon; ask us to send you immediately full information and prices; let us tell you which of our 24 branch offices is nearest to you, so that you may arrange if you wish for a FREE demonstration in your own home—or a 10-day FREE trial if you are too far from the nearest office.

PONSELL FLOOR MACHINE CO.
Dept. 124, 220 West 19th St., N. Y. C.

Please mail me full information and prices regarding your Electric Floor Machine.
I am interested in { business / residence } floors.

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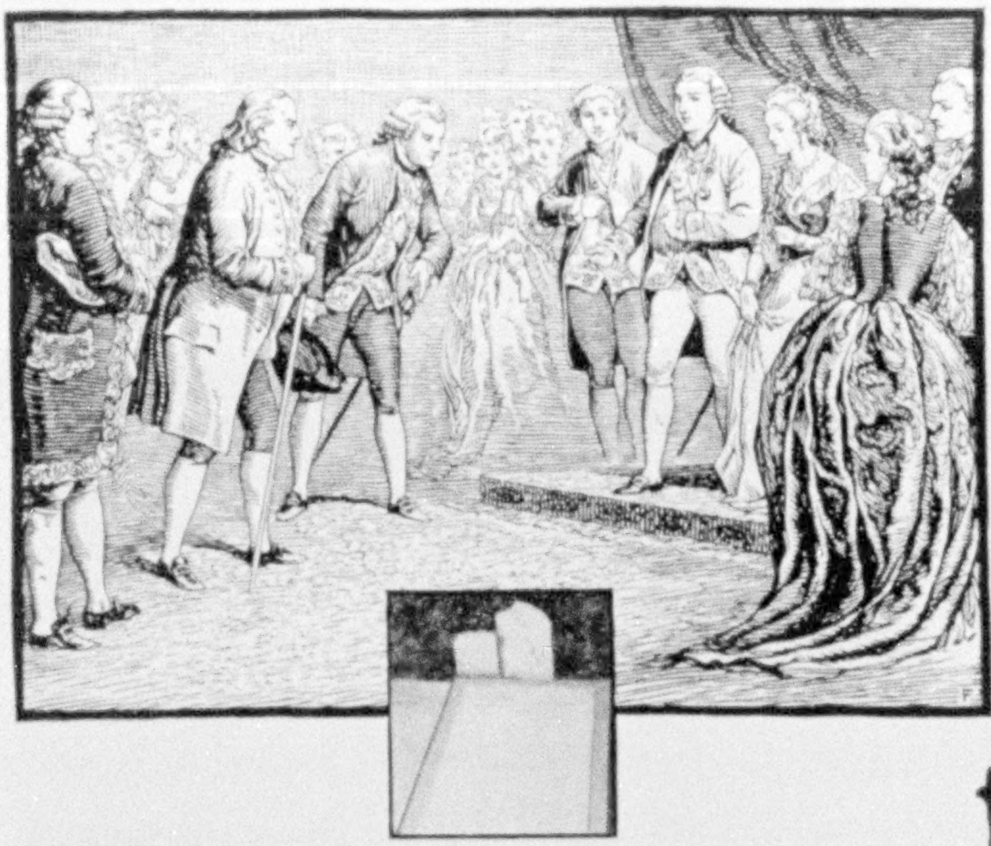
City.................... State..........



A plain slab marks the grave of Benjamin Franklin and his wife, Deborah. It is in the Old Christ Church burying ground, Philadelphia.

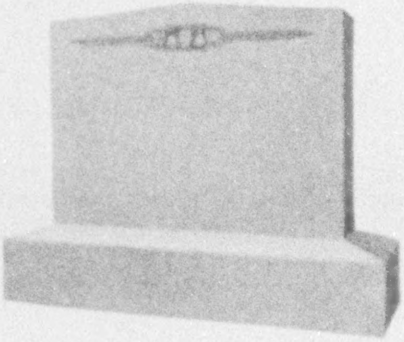
Number Three of a Series

Benjamin Franklin

Statesman and diplomat—who helped frame the Constitution of the United States and who, by his persuasive eloquence, won for his country the friendship and aid of France; philosopher and writer; pioneer in electrical research; dean of American printers.

It is not that we ourselves may remember, that we erect a memorial. For the memory of those dear to us is everlasting. But that we may give outward sign to the sacred thoughts which their memory brings to us.

"Mark Every Grave"



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These trained, reliable Davey Tree Experts live and work in your vicinity. They are easily and quickly available to you. No car fare is charged and you pay only for actual working time at reasonable rates, plus the necessary materials and the cost of delivering them.

You can afford Davey Tree Expert Service. Eighty-four per cent of Davey clients in 1926 paid less than $200.00 each. The total volume of business last year was $2,000,000, but the bulk of this was made up of small operations for people of moderate means who appreciate their trees as living things and priceless possessions. Above everything, get reliability. Davey Tree Experts will save your trees without guessing or experiment. Write or wire nearest office.

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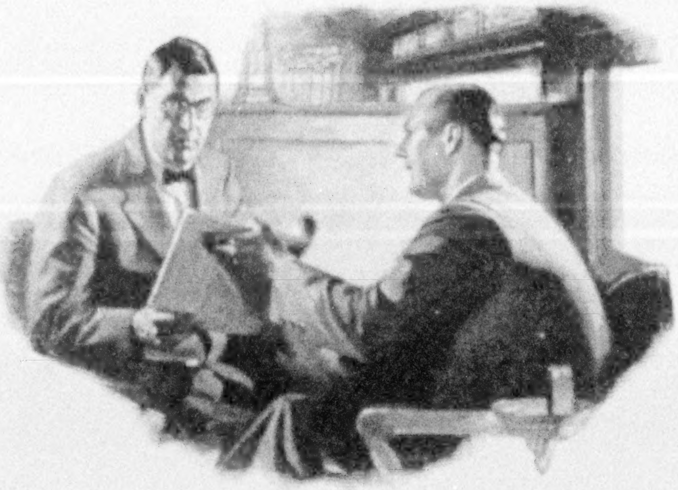

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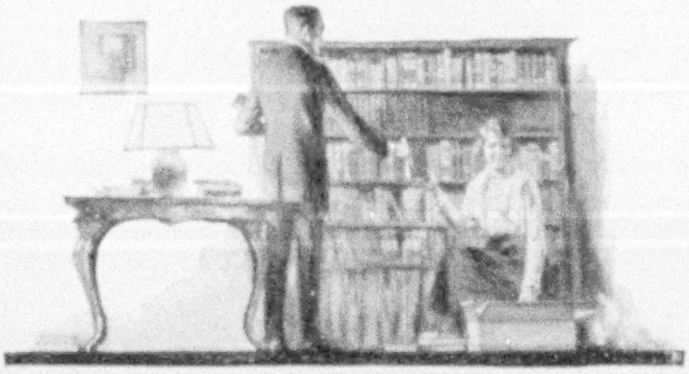

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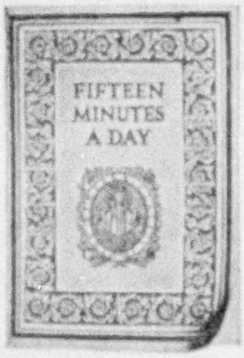

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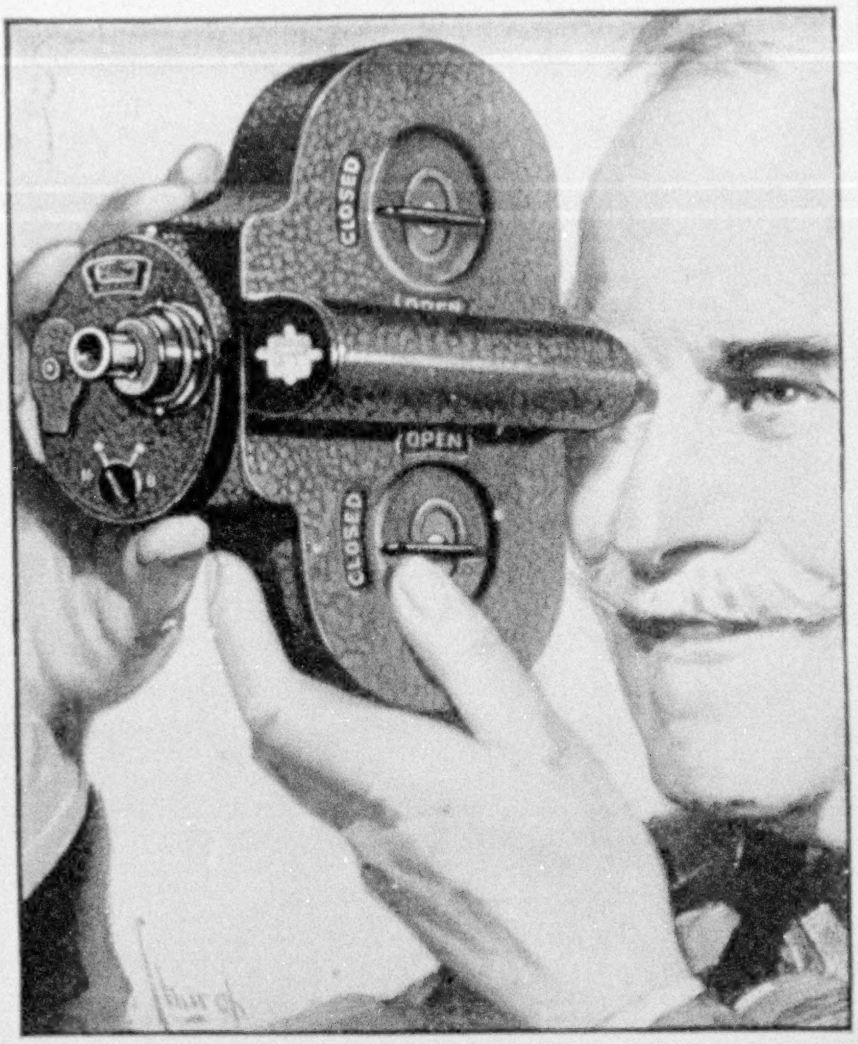

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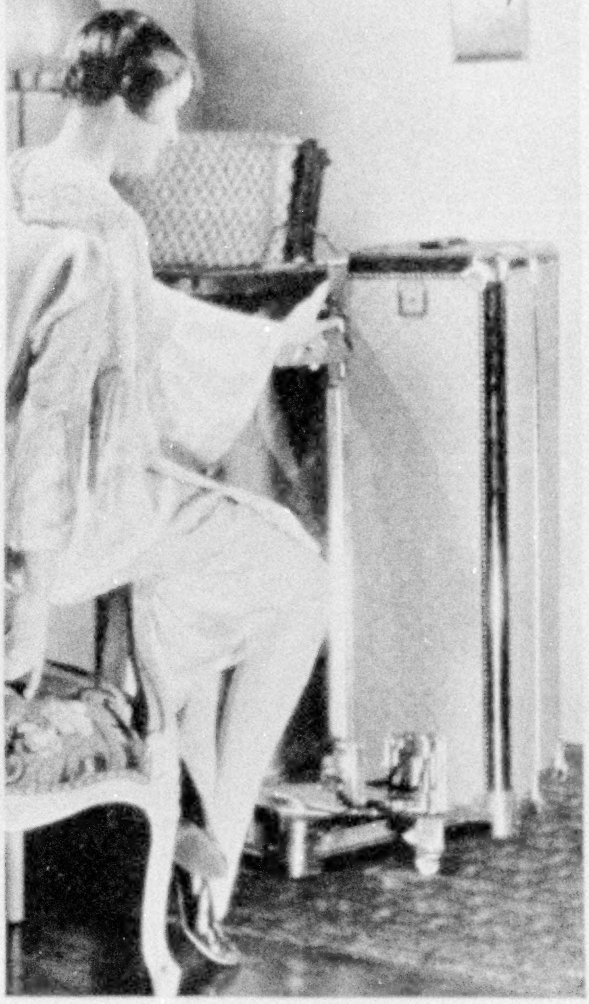

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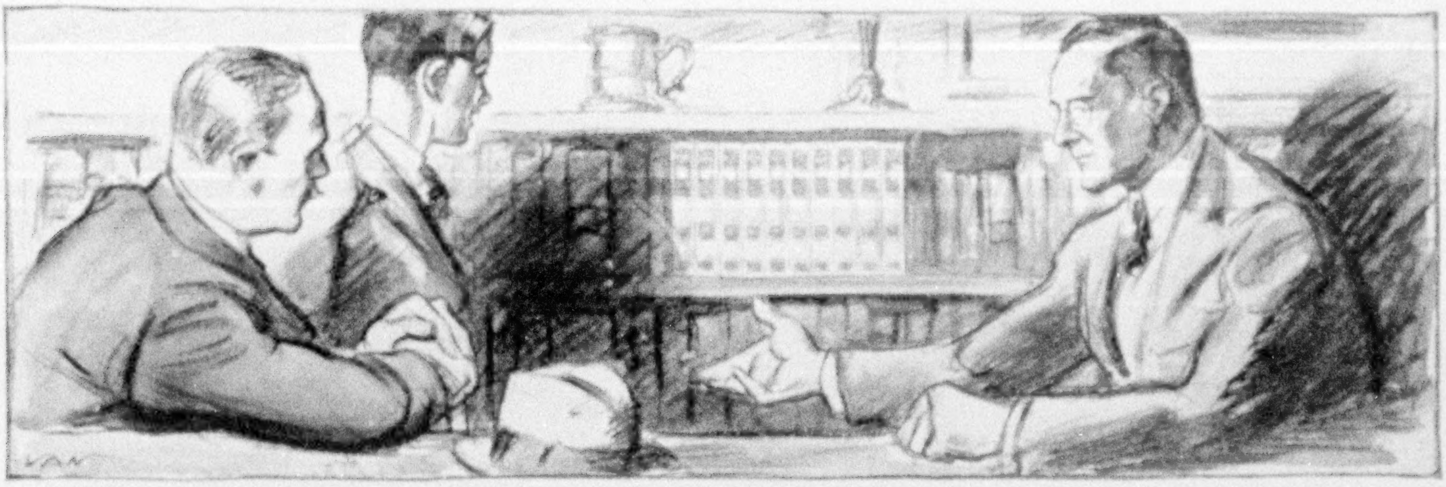

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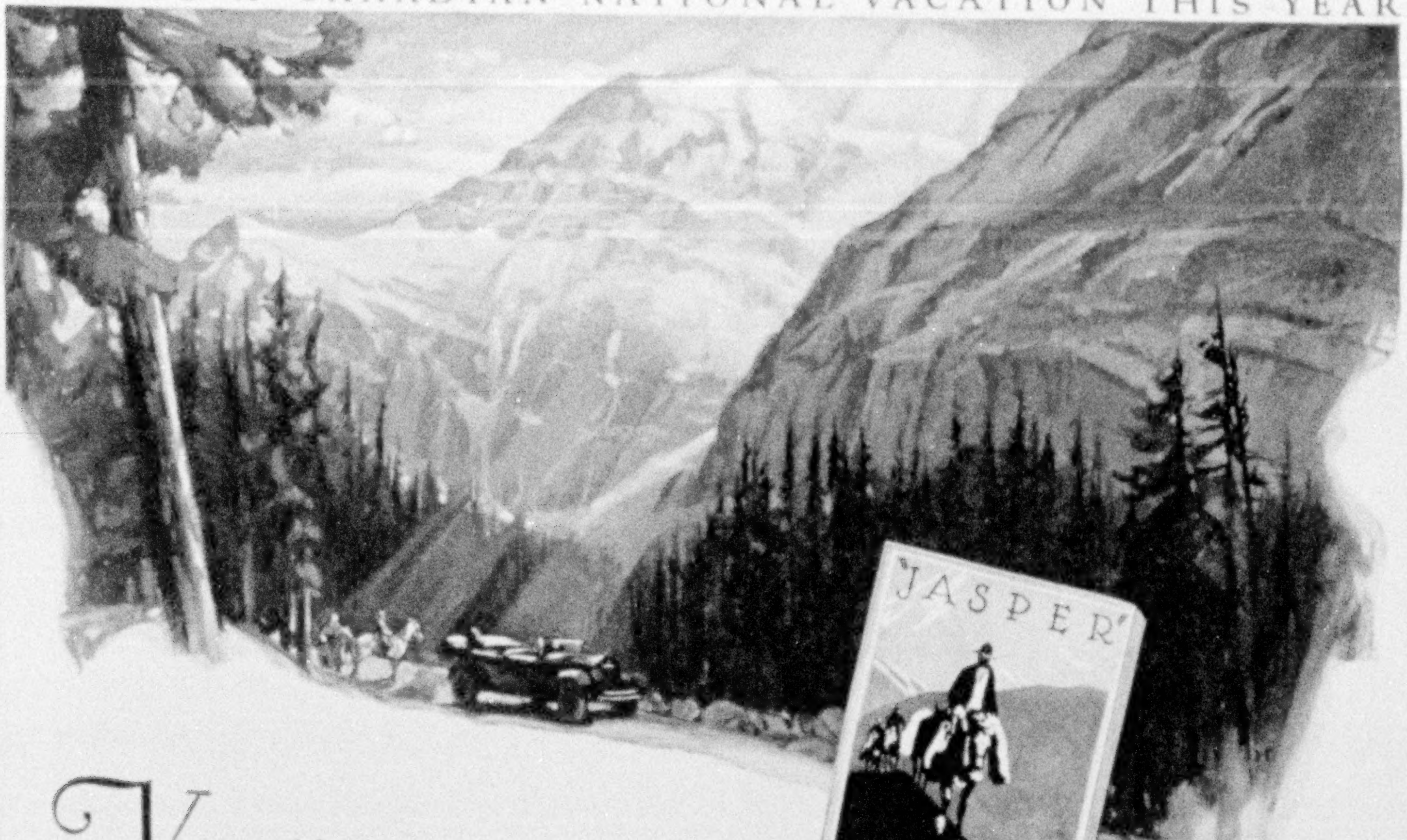

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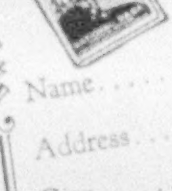

Please send me your free booklet on Jasper National Park, also Tourist Map of Canada.

Nat. Geo. 3

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Come out to San Francisco, your central point, your starting place, for the vacation and the opportunities you want to find in California. By rail, it's almost a business day nearer to Chicago than ever before; by the new Victory and Lincoln Highways you can motor across the country, over good roads.

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"Oakland, Calif.,
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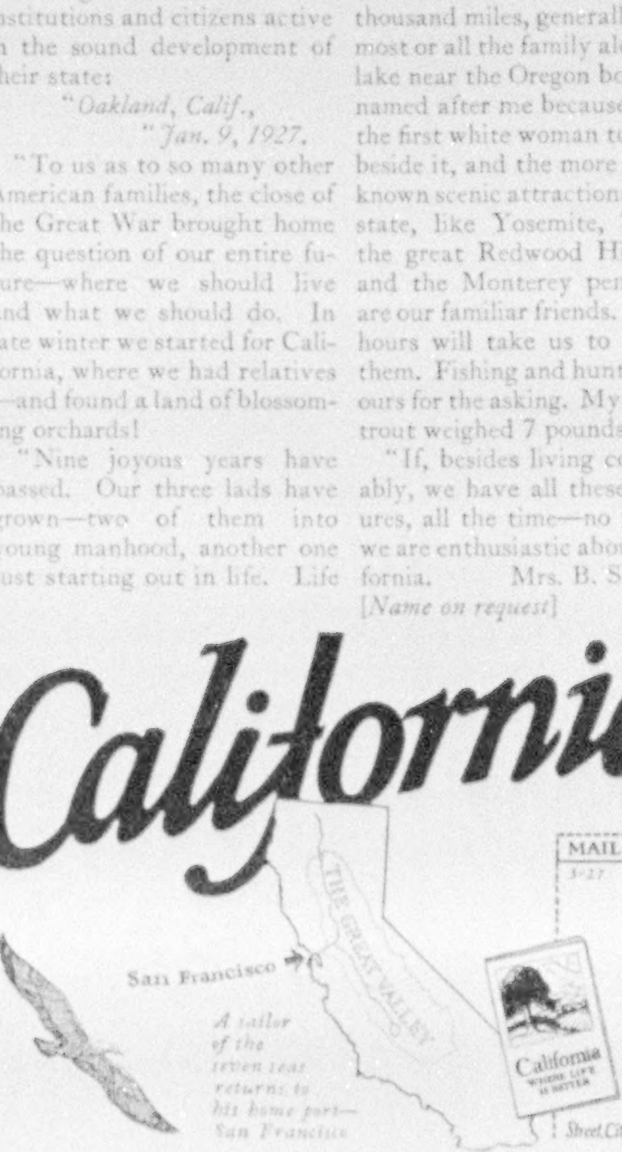

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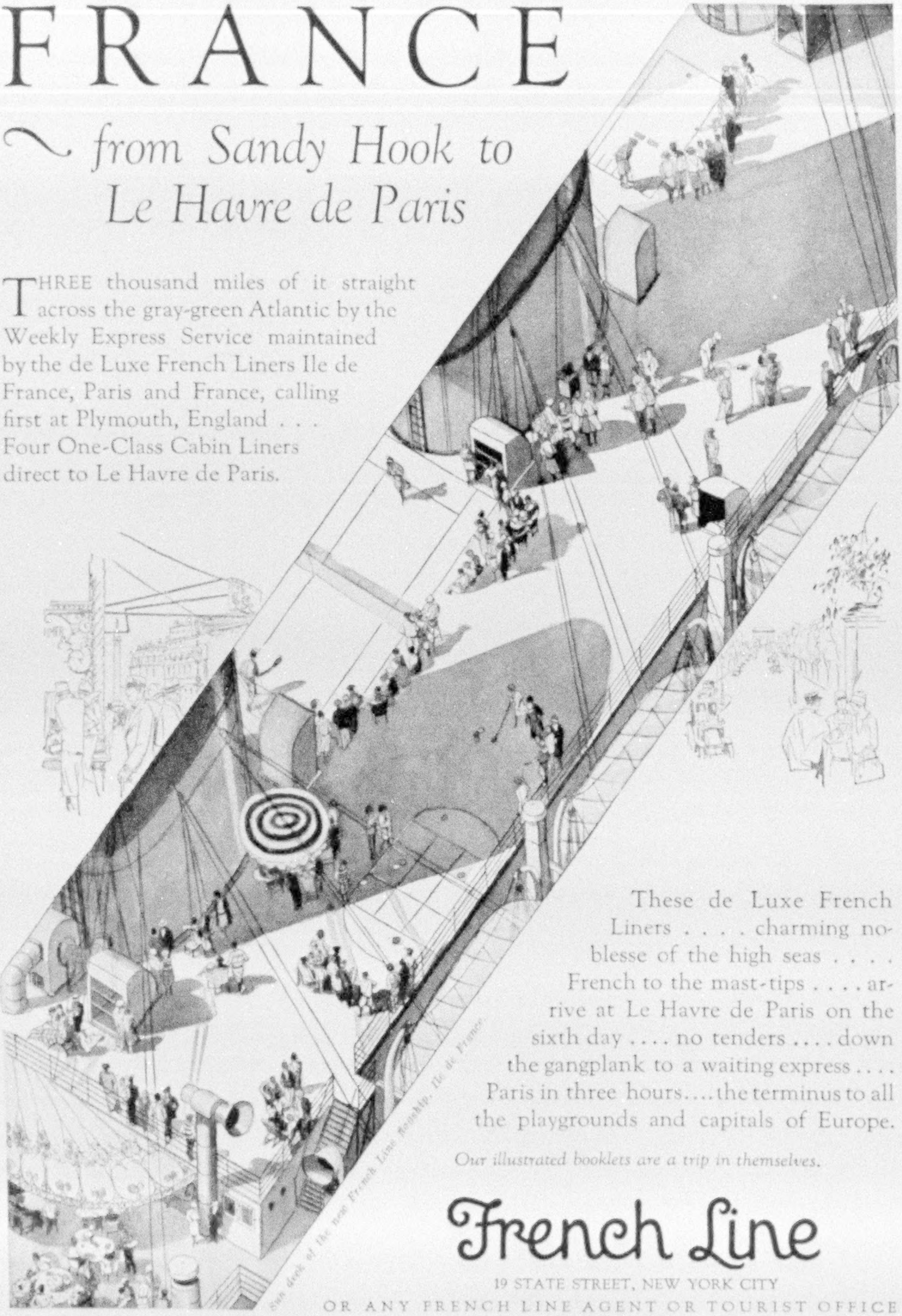

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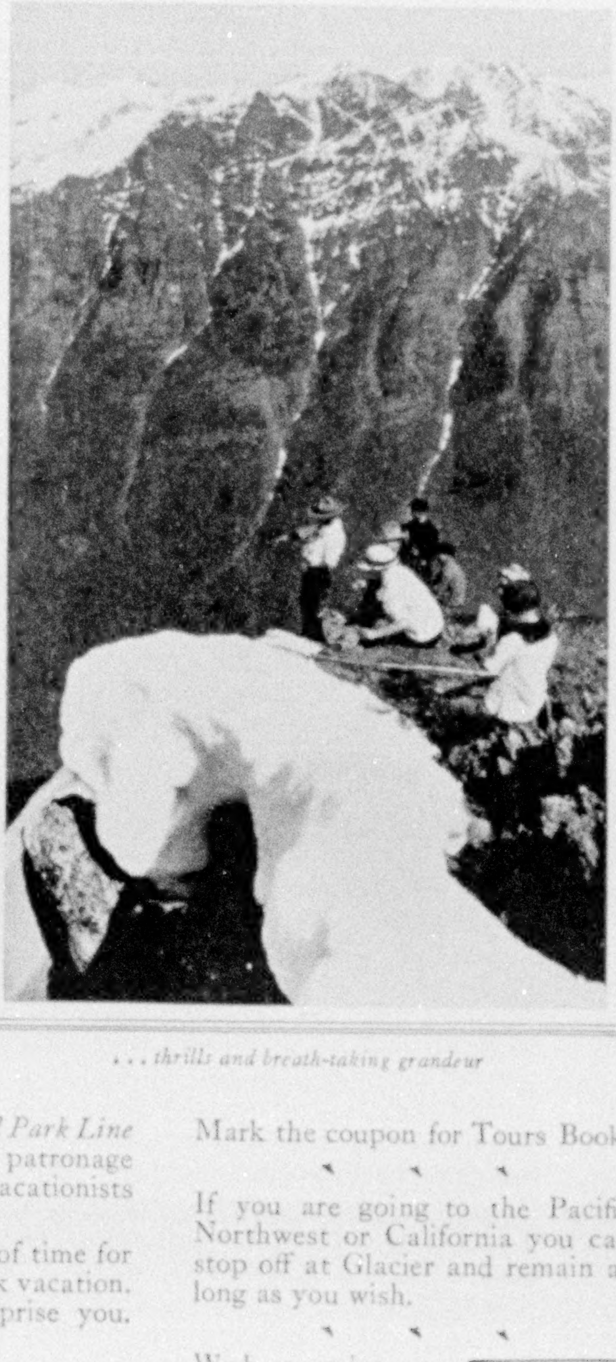

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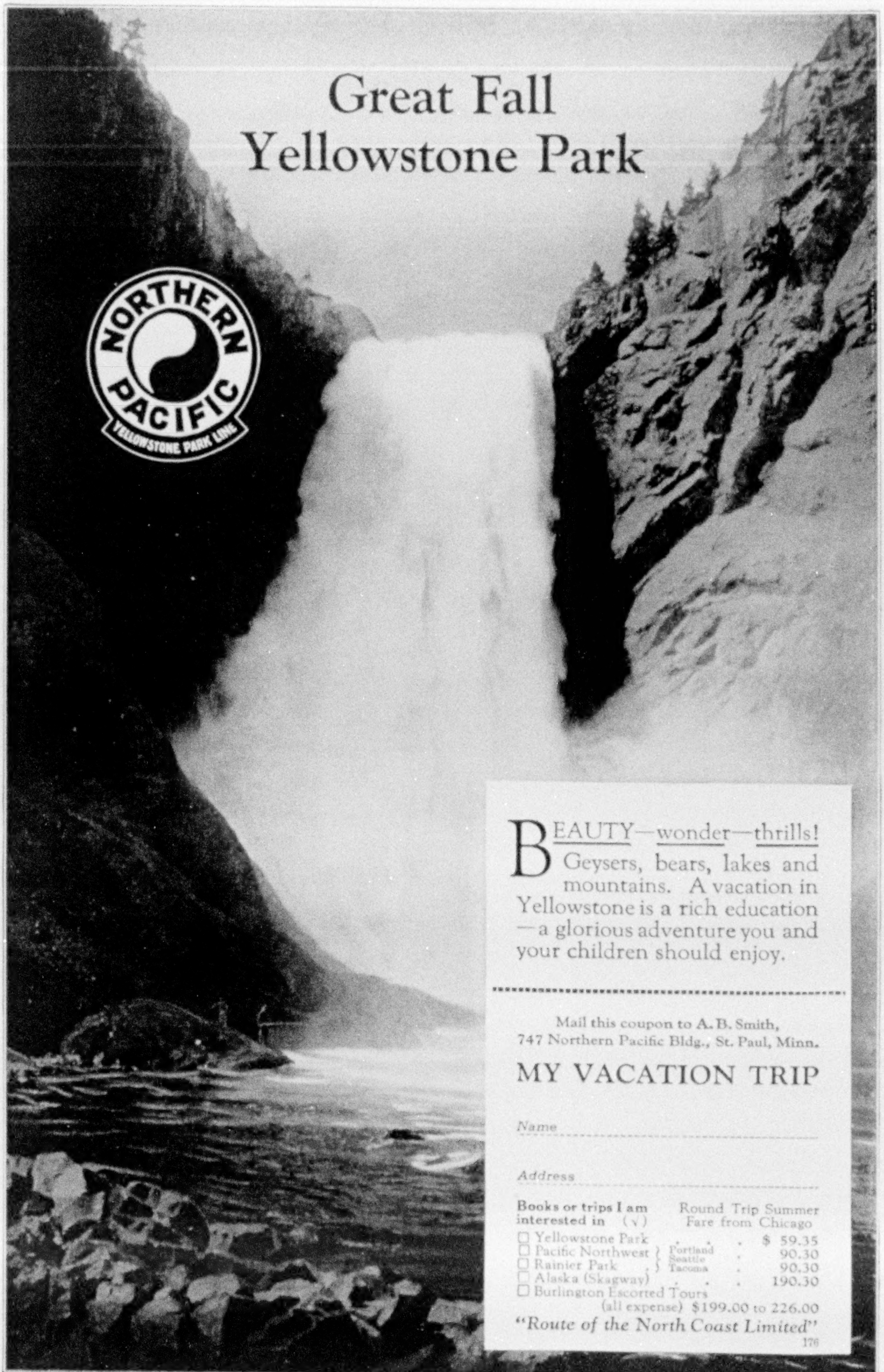
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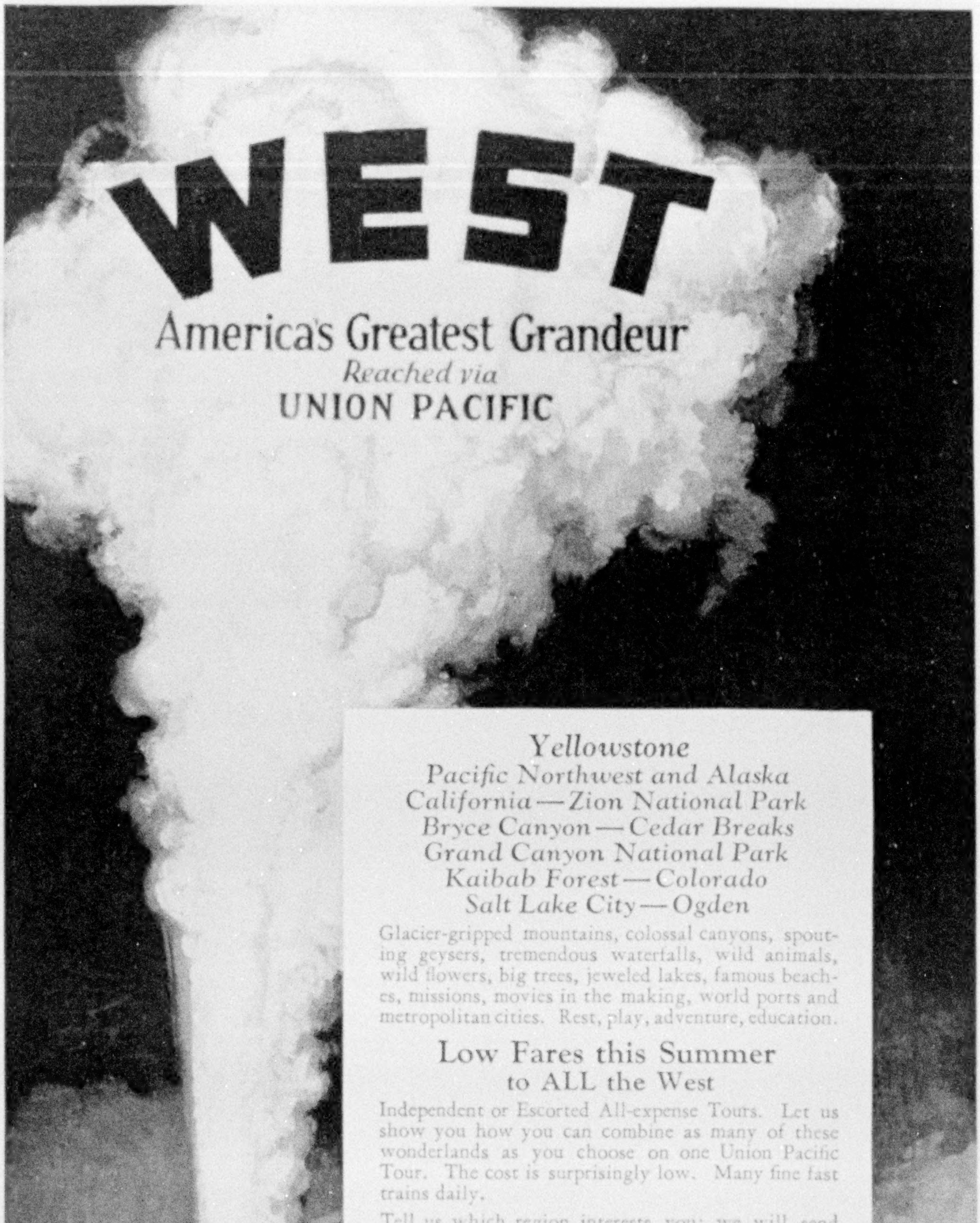

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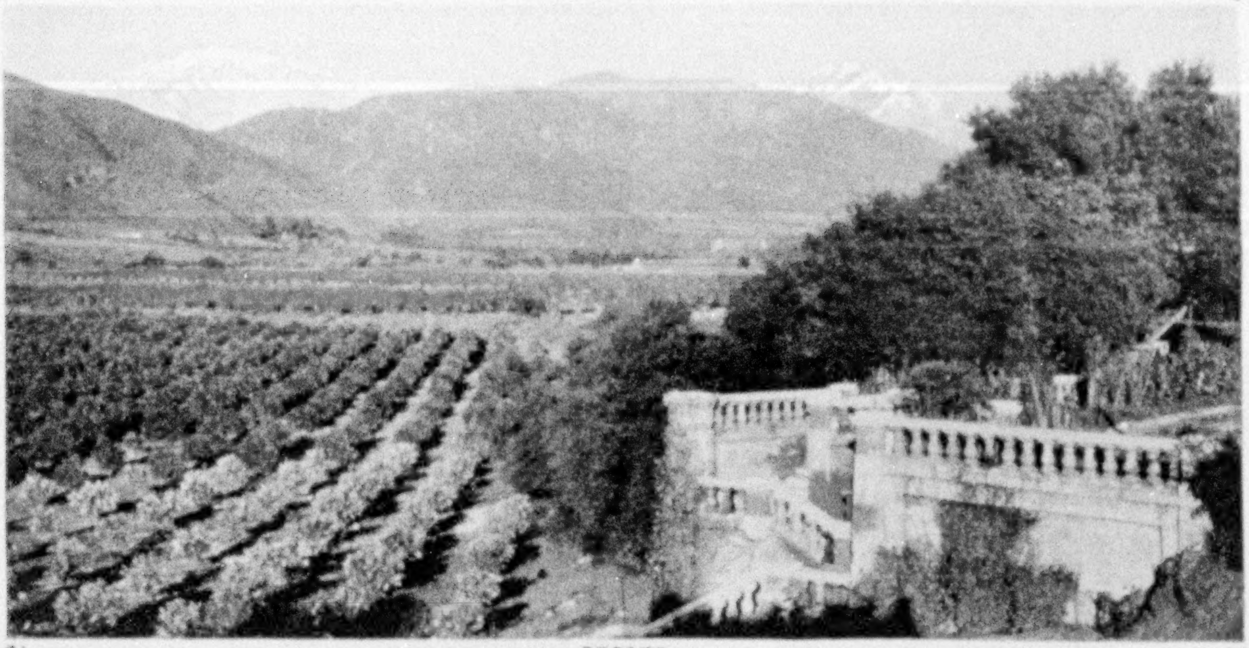

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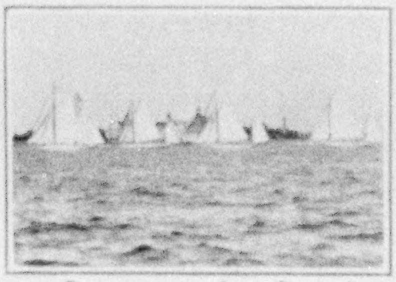

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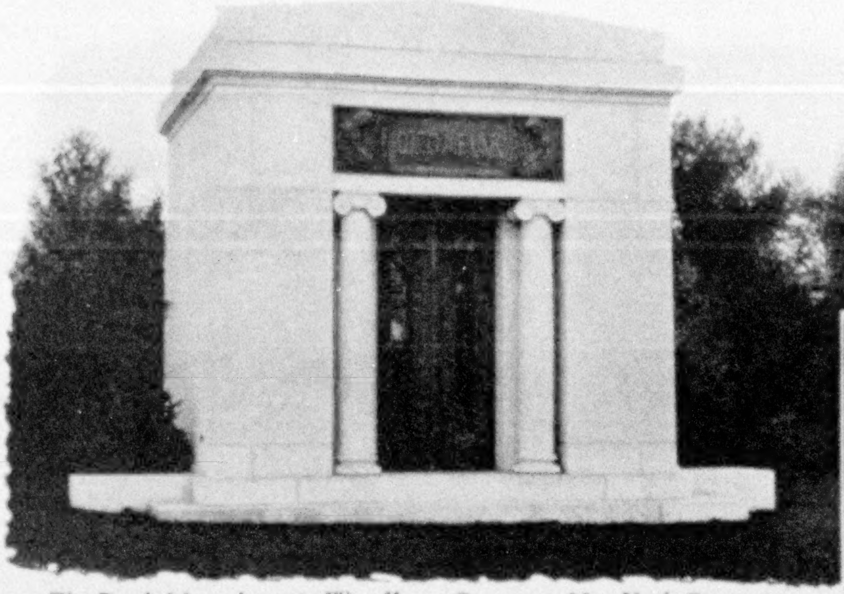

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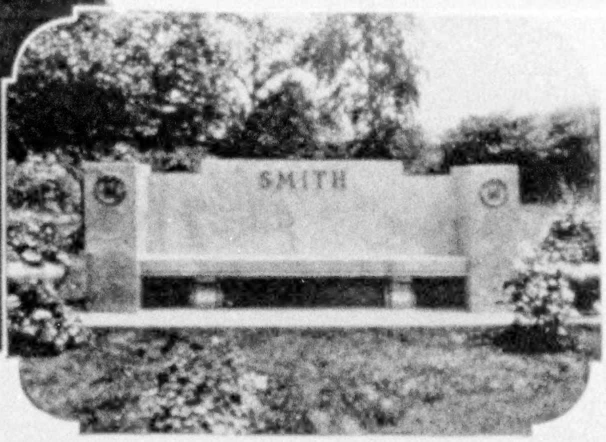

Memorial to family of Sidney Smith (the cartoonist) of Stony Creek Granite, all polished finish, in Rose Hill Cemetery, Chicago

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A NOTED physician said recently, "The woman who conceals her age is a public benefactor. Age is not a matter of years but of tissue changes. While she keeps her body and spirit young, she is young."

If you have associated with persons past 50 or 60, you may have listened to much solemn talk about arteries—well intended, but mostly untrue. For example, "old as your arteries," "old as you look," "old as you feel," being part-truths are swallowed whole or rejected entirely.

That arteries which become thick and brittle may bring an abrupt ending to life is generally known. But it is not generally known that either defective arteries or high blood pressure may be responsible for serious changes which occur in heart, kidneys and brain.

High blood pressure is not a disease. It is a definite indication that something is wrong somewhere in the body. Sometimes high blood pressure and diseased arteries are caused by focal infection in head or body; sometimes by poisons—the left-overs of previous infectious disease which were neglected and never completely eliminated; sometimes by overweight or overwork or unhappy mental conditions—worry, fear, anger, hate, anxiety.

Your doctor can find out in a few minutes whether or not your blood pressure is normal for your age—whether or not your arteries are healthy. There is no way for you to judge your condition.

Thanks to sound advice of physicians, thousands and thousands of men and women have been saved from acute or chronic trouble by removing the cause. Others, who have found the cause past correction—as it sometimes is—have lived to old age with hardened arteries, high blood pressure, or both, because they learned how to live—eating, working, exercising wisely and in *moderation*.

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It was found that the number of overweight persons who showed a blood pressure above normal was more than twice that of persons of approximately average weight.

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VOL. LI, No. 4 WASHINGTON APRIL, 1927

THE NATIONAL GEOGRAPHIC MAGAZINE

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THE RACES OF DOMESTIC FOWL

By M. A. JULL, PH. D.

POULTRY HUSBANDMAN, BUREAU OF ANIMAL INDUSTRY, U. S. DEPARTMENT OF AGRICULTURE

With Illustrations in Color from Paintings from Life by Hashime Murayama, Staff Artist

IT IS a far cry from the time that man first heard the crow of the wild cock of the bamboo jungles of India to the cackle of the highly domesticated hen upon celebrating her production of 1,000 or more eggs.

From time immemorial, fowls have entered closely into human life in a variety of ways. They have made important contributions to the food supply of many nations and their feathers have served for the greater warmth and comfort of mankind. The pugnacious character of the wild cock led to the development of the sport of cockfighting, which frequently had a remarkable influence on civilizations of bygone days.

From the esthetic standpoint, members of various human races have busily occupied themselves in evolving plumage colorations in bewildering variety, and have also produced changes in feather structure and body type that demonstrate the relative plasticity of the original stock.

What man has accomplished within recent years by breeding from selected variants has been shown by his success in developing the large number of breeds and varieties of fowl known to us to-day. In these and in other ways, because of their small size as compared with many other domestic animals and because of their adaptability to a wide variety of climatic conditions, fowls have entered into the interests of more human beings than any other animal.

The regard which ancient peoples had for the fowl is recorded in the outbursts of the poets and in the chronicles of the naturalists.

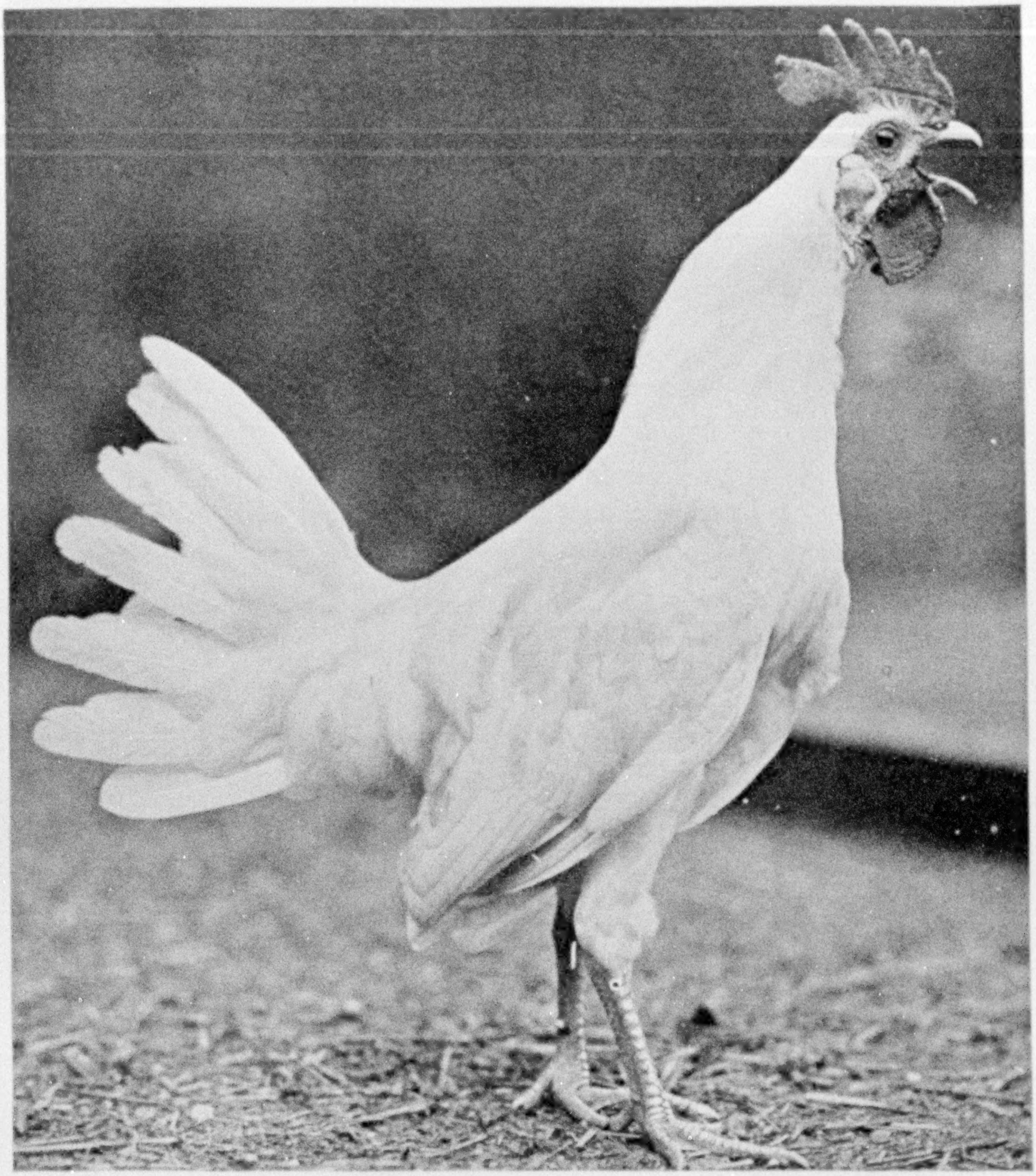
THE ANCIENTS HELD FOWLS AS SACRED

The cock and the dog were sacred animals in the religion of Zoroaster. A verse attributed to Chanakya, written about 300 B. C., says that four things may be learned from a cock—to fight, to get up early, to eat with your family, and to protect your spouse when she gets into trouble.

The cock was once regarded as the possessor of many mystic qualities. It was believed, for instance, that while the devil would never enter the house of one who slaughtered a white cock with a divided comb, such a person would suffer loss of his possessions.

Properties of various kinds were attributed to different parts of the cock, and if they had been founded on fact the domestic fowl would long since have been regarded as one of mankind's greatest benefactors. It was claimed that bad habits would depart from a man who drank of a solution containing the dried comb of a cock, and the smoke of the dried comb of a white or of a red cock was of benefit to a madman.

Loss of memory was cured by taking, in the morning, on a fasting stomach, a mixture of the gall of a cock and mutton broth. Pain was relieved immediately by taking pills made of pounded dried flesh of a cock with equal quantities of gallnuts and sumach. Man's virility was supposed to be greatly increased by an application of cock's blood mixed with honey.



Photograph by Harry F. Blanchard

HIS MAJESTY OF THE BARNYARD

"Who is he who sets the world in motion, a mighty speared and lordly god? It is Parodaro, the cock that lifts up his voice against the mighty dawn." Thus rhapsodizes one of the ancient sacred books of the Parsees, who worshiped the forbears of our modern domestic fowls.

The properties possessed by the cock were not all regarded as beneficent, however, as demonstrated by the belief that blood drawn in a cockfight mixed with food and given to a number of people would cause dissension among them. Another interesting piece of fiction was that the cock laid one egg in his lifetime, but that it was very small.

In China the fowl was long esteemed primarily as an edible bird, in Persia as an object of sacrifice, in India and Greece as a fighter par excellence, and among many peoples as an animal of great religious significance.

WHENCE CAME THE WILD FOWL?

With the passage of time, man's conception of the various attributes of the cock and his mates has become more prosaic, but there is keener appreciation of the actual service they render.

Millions of years ago the fowl had its beginning in the first known bird, called the Archæopteryx (ancient winged creature). This was probably not the first bird, though it is the first one of which there is any definite record. The remains of two specimens imbedded in the deposits of the Jurassic period have been recovered, one now being in the British Museum and the other in the Berlin Museum of Natural History.

The Archæopteryx was about the size of a crow, but had certain features not possessed by any birds now extant. Instead of the broad, fan-shaped tail of modern birds, the Archæopteryx's was lizardlike and was fringed with large feathers. There were three entirely free digits, each armed with a claw, in front of each wing, and its skin-covered jaws were furnished with teeth, which no modern bird has.

The remains of the Archæopteryx indicate that perfectly formed feathers were in existence at least 150 million years ago.

Courtesy British Museum

THE FORM OF THE FIRST KNOWN BIRD, PRESERVED IN STONE

Two specimens of this fossil lizard-tailed bird, the Archæopteryx (ancient winged creature), have been found imbedded in deposits of the Jurassic period. This one, in lithographic stone from Eichstätt, Bavaria, is in the British Museum; the other is in the Berlin Museum. The Archæopteryx had teeth and a tail with long feathers on either side. The latter may be seen at the bottom of the picture.

Specimens of two other birds with teeth, Ichthyornis and Hesperornis, were discovered by Professor O. C. Marsh imbedded in the rocks of western Kansas. The Ichthyornis was about the size of a pigeon, while the Hesperornis was nearly as large as a man and was wingless. These birds inhabited the earth about 90 million years ago.

The teeth of the earliest known birds have disappeared and in many other ways structural changes have taken place, until to-day there are species that are especially adapted for flying, running, burrowing, swimming, or diving. Think of the great difference between the ostrich and the mallard duck, or the eagle and the humming bird. However different these forms may be, they all have one thing in common, the presence of feathers.

PHEASANT FAMILY IS DIVIDED BY TAIL-MOLTING PECULIARITIES

The whole group of birds, called Aves (from the Latin *avis*, meaning a bird), comprises many orders, families, sub-

Photograph by Ira J. Ingraham

READY FOR A BALINESE COCKPIT

The poultry industry traces its beginning to the breeding of birds for cocking mains.

families, genera, and species, and according to the characters birds possess are they thus classified. On this basis the wild fowl has been shown to be closely related to the pheasant.

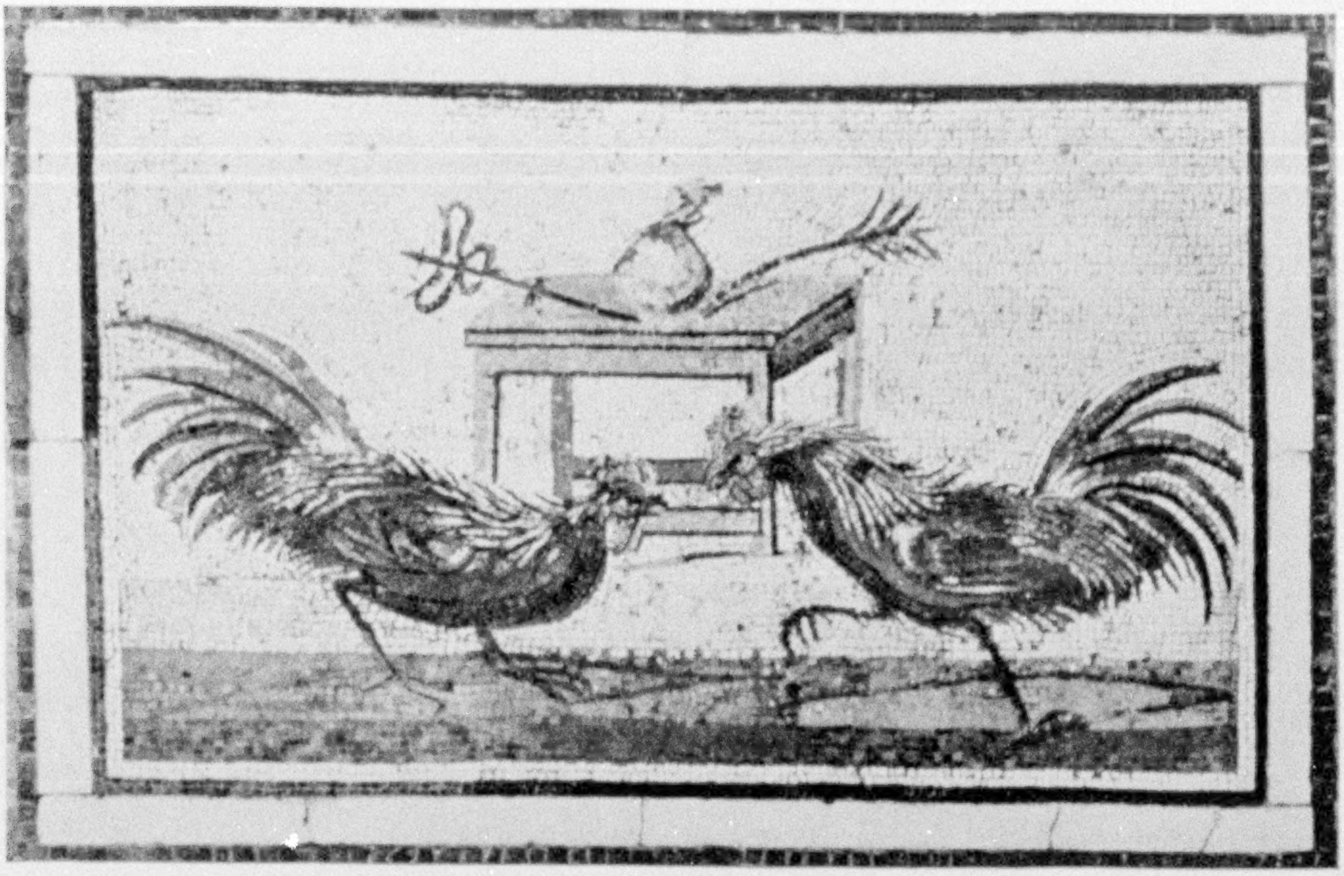
The pheasants all belong to one family, called the Phasianidæ, which is comprised of four subfamilies. The chief distinguishing feature among the subfamilies is the manner of molting the tail feathers.

In the first subfamily the molt of the tail is centrifugal—that is, the feathers molt in regular order from the center to the outside; in the second subfamily the tail molt is centripetal—that is, the feathers molt from the outside to the center; in the third subfamily the tail molt is from the third pair of feathers, outward and inward; in the fourth subfamily the tail molt is from the sixth pair outward.

ORIGIN OF THE DOMESTIC FOWL

In the fowl the tail molt is centripetal, so that it belongs to the second subfamily, called Phasianinæ. There are several different pheasants belonging to this subfamily, but the fowl is the only pheasant with a fleshy comb, so that it is placed in a genus called Gallus, meaning a comb.

The original habitat of the wild fowl is



A COMBAT IMMORTALIZED IN STONE

This mosaic of a cockfight is preserved in the National Museum at Naples.

south and central India, the lowland belt at the foot of the Himalayas, Assam, Burma, Ceylon, and throughout all the countries to the southward, on into Sumatra and Java, with the string of lesser islands to the eastward.

The eminent naturalist Darwin, who made a close study of the possible origin of the domestic fowl, concluded that our domestic stocks were all derived from one species, the Red Jungle Fowl (see Color Plate II). The great majority of present-day naturalists agree in this.

SPORT OF COCKFIGHTING FOSTERED DOMESTICATION OF FOWLS

The domestication of the cock in China dates back to as early as 1400 B. C.

In India, 1000 B. C., when the Aryans had reached the Ganges, the cock was well known. It moved northward and westward, against the line of Aryan invasion, and reached Bactria and Persia at a very early date.

The image of the cock appeared on coins from the temple of Artemis at Ephesus at least 700 B. C., yet this bird did not enter into Greek mythology.

The first European distribution of the cock was overland rather than by sea or by coastal colonists. The Romans found it well established in Gaul, England, and among the Germans.

That the sport of cockfighting exercised a tremendous influence not only in the domestication of wild birds, but also in the subsequent distribution of the fowl, is amply demonstrated by the importance attached to the pastime by many peoples.

For centuries cockfighting has been a favorite pastime in southern and western Asia, Sumatra, Java, Borneo, and the Philippines. From India the sport was introduced into Persia when India was conquered by the former, in the sixth century B. C. Two hundred years later, when Greece overran Persia, the sport was introduced into Greece.

Cockfighting is still indulged in as a very serious enterprise in many countries. The breeding of fighting birds is highly specialized and the feeding of those intended for the pit is considered extremely important. One recipe for the preparation of a cock's diet used in the training of birds in India calls for the yolks of 200 eggs, mixed with definite portions of musk, good ambergris, saffron, sugar, almond kernels, kernels of the edible pine,

Photograph from Helmig and Company

COCKFIGHTING ON MADURA ISLAND, DUTCH EAST INDIES

The followers of this most popular of Far Eastern sports will wager their purses and property, and even their wives and children, on their favorite bird.

and fine wheaten flour. The flour is first well fried in butter, and then the sugar is added. Next are added all the pounded ingredients.

Directions for feeding are explicit. The first day a small quantity is given as a dose, and on the top of that a feed of wheaten flour unmixed with butter, so that the grease may be removed from the cock's throat. Then the fighter is muzzled, so that it may neither pick up any grit nor drink, but is allowed to exercise himself.

Natives of the Malay Peninsula, Java, and Sumatra often stake all of their property on a battle; if this is lost, they stake their wives and children.

Cockfighting was a popular pastime in England during the reign of Henry II, but it was put down as unlawful in the reign of Edward III, and again in 1569, during the reign of Henry VIII, who, however, built a cockpit in Whitehall. The sport was revived in the reign of Elizabeth, and James I and Charles II entertained guests at cockfights.

Cockspur Street and Cock Lane, in London, did not get such names by accident. Huge sums of money, sometimes as much as $50,000, frequently changed hands at the mains. For many years schoolmasters received a regular fee for permitting cockfighting at school. The sport flourished until suppressed by act of Parliament in 1849.

BOSTON HAD FIRST AMERICAN POULTRY SHOW

With the suppression of cockfighting as a public institution, poultry exhibitions had their inception. In 1849 the first poultry show was held in America at Boston, and about the same time the first poultry show was held in England.

These exhibitions gave impetus to the growing interest in the then known breeds and varieties of fowl; for by that time several countries had each developed races possessing characters differentiating them from races produced elsewhere.

India had produced its fighting cocks, other parts of Asia their massive breeds with feathered shanks, Italy its small-bodied birds with nervous dispositions, England its game cocks and breeds excelling in fleshing properties, and America its numerous early breeds.

Early poultry exhibitions tended to encourage the development of new breeds and varieties. This was especially true with what are often called "fancy" characteristics. Consider, for instance, the miniature Bantams (see Color Plates XIV, XV, and XVI), where smallness of size is one of the outstanding features; the vulture hocks on the Sultan breed (see page 447), and the highly developed crest on the Polish breed (see Color Plate XII).

The exhibitions also stimulated improvement of the economic qualities of many breeds. This has been true particularly in England, where the Sussex (Color Plate X) and Dorking (see page 448) reached a high state of perfection as meat producers, and in America, where the general excellence of such breeds as the Plymouth Rock, Rhode Island Red (see Color Plate VIII), and Wyandotte (Color Plate IX) is recognized by all, and the Italian Leghorn (Color Plate VII), as a laying fowl, has been greatly improved in type.

ASIATIC AND MEDITERRANEAN FAMILIES PRESENT STRONG CONTRASTS

The Asiatic races of domestic fowl were the first to assume any prominence and were bred primarily for their economic qualities.

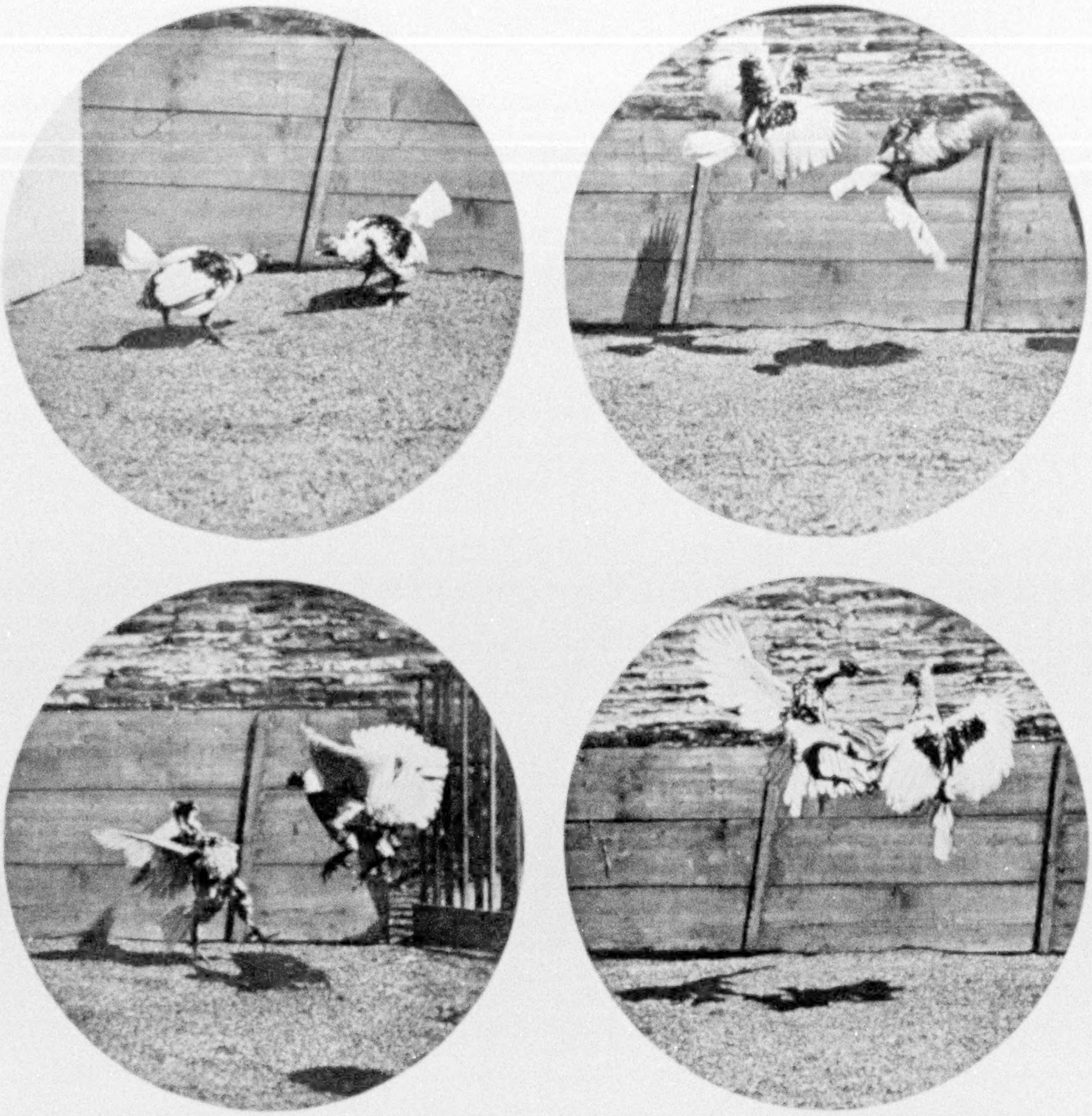
They were large-bodied, heavy-boned birds with excellent fleshing properties, and several of the races were characterized by heavily feathered shanks.

The early Mediterranean races, on the other hand, were probably not much more than one-half the size, on the average, of the Asiatic specimens, and, besides being small-bodied, were small-boned and not nearly so well adapted for table purposes.

Here, therefore, were two distinct races of domestic fowls. From these two basic races each poultry-raising country has developed its own fowls, establishing fairly well-defined standards for the various groups of birds that came to be known as breeds.

The most important feature whereby one group or breed of fowls is distinguished from another group is in respect to type, although this is rather a confusing situation, inasmuch as the visible body type is influenced not only by the actual shape of the body, but also by the feather contour.

In the breeding of poultry for exhibition purposes, the "type" of a bird, as



Photographs from Dr. M. A. Jull

BIRDS IN BATTLE

Sizing up the enemy; the first blow; on the defensive; at it, spur and beak. Note how the birds have been dubbed for the combat.

determined by feather contour, has been regarded as of greatest importance, so much so that in many cases the actual body type has received minor attention.

Within each group or breed of fowls there was a tendency to segregate various color combinations, or, where only one color existed in the original breed, there was a tendency to develop new color patterns. In either case it was necessary to adhere to the original type or shape characteristic of the breed. Therefore varieties of a breed are supposed to be identical in all characteristics except plumage color, or, in some cases, in respect to the shape of comb, color of shanks, and other minor characteristics.

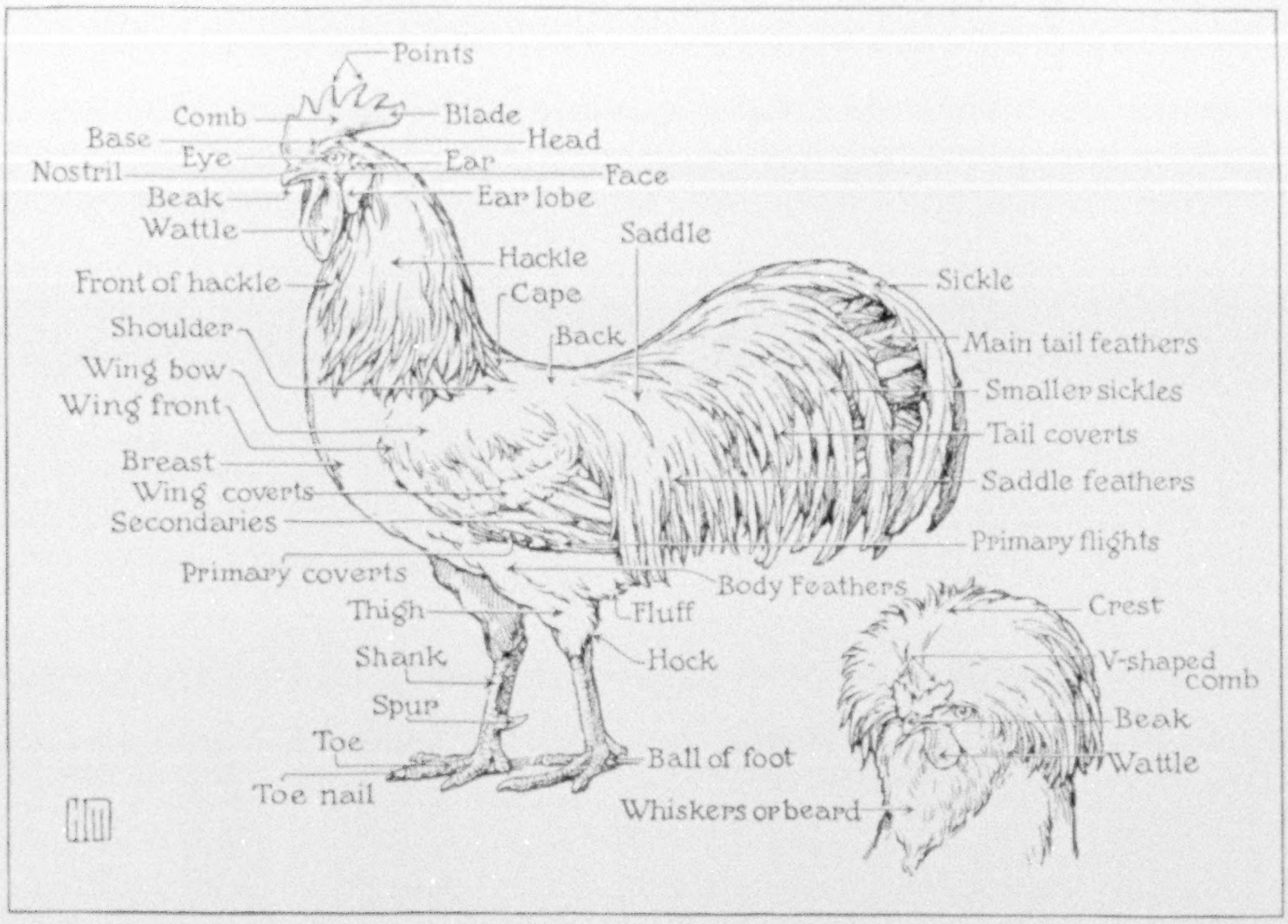
There is a large grain of truth in the old saying of poultry breeders, that "shape makes the breed and color the variety."

HOW COLORS IN FEATHERS ARE PRODUCED

The varied array of plumage patterns found in the domestic fowl is bewildering. Not only are there different colors, such as brown, buff, blue, red, and black, but various combinations of these.

The possible number of color variations is practically unlimited.

The original color pigments in the plumage of fowls were probably red and black. The absence of any color pigment pro-



Drawn by Hashime Murayama

AN OUTLINE CHART OF A COCK

The drawing shows all of the anatomical parts of the fowl commonly used in descriptions and in discussing standards of perfection. The head at the lower right is that of a crested bird.

duces white. In the modern breeds and varieties, however, there is an array of variously marked feathers possessing such color characteristics as lacing, penciling, barring, stippling, spangling, and mottling (see illustrations, pages 388 and 389). These characteristic color markings are produced by the pigment being laid down in a definite manner.

Colors in feathers are produced in two principal ways—when a real color pigment is present and when the structure of the feather constitutes a miniature prism, breaking up the rays into the iridescence of a spectrum.

The colors so commonly observed in domestic fowls, such as the black, red, brown, and buff, are due to the presence of pigment or coloring matter in the shaft or vane of the feather.

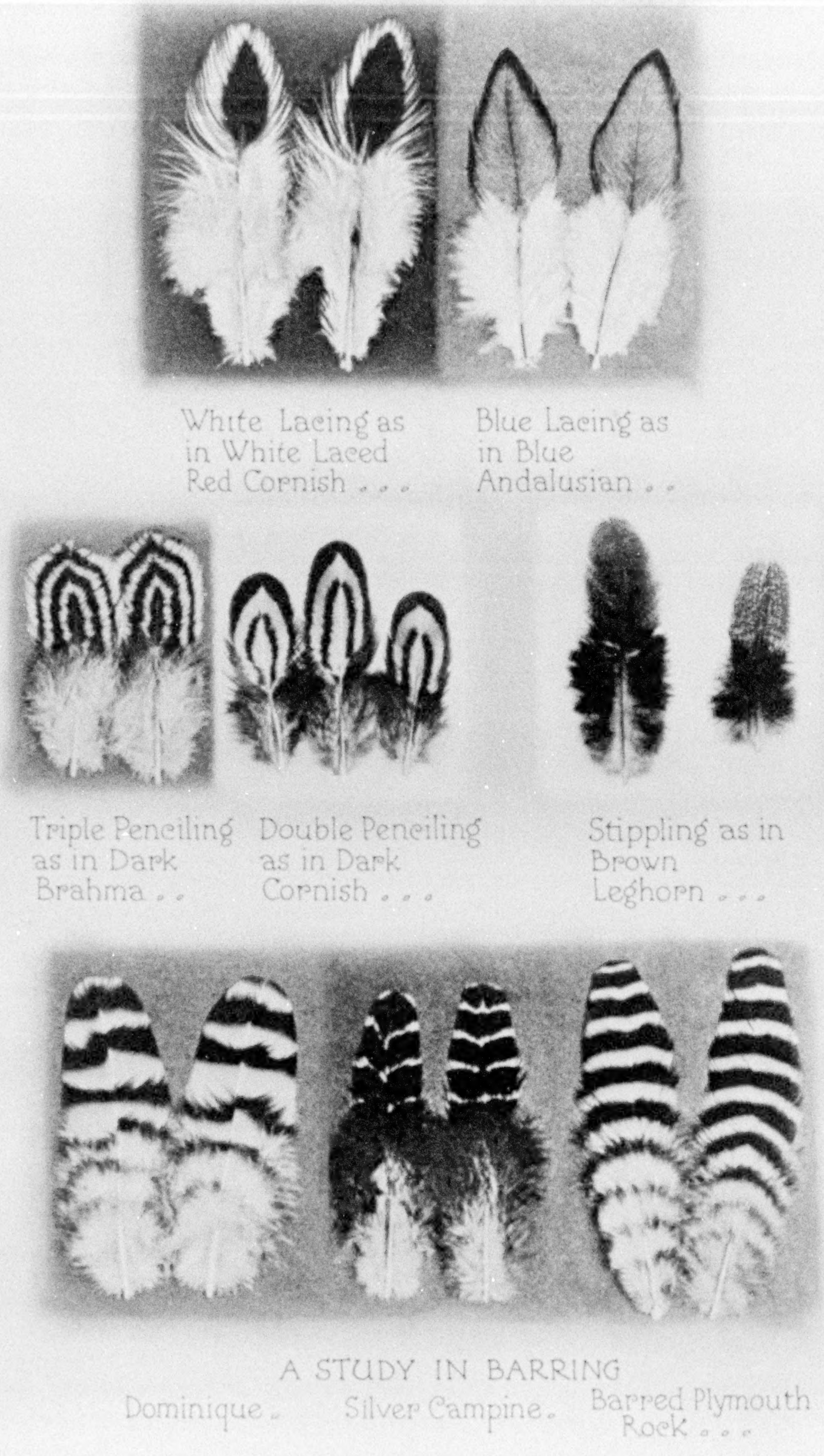
Green is never found in the domestic fowl, nor for that matter, as a pigment in any bird, domestic or wild, except in the feathers of a small family called Plantain-eaters, inhabiting west Africa. Even in this case it was long believed that the natives dyed the birds artificially, because when they were kept in captivity the beautiful scarlet patch on the wing would gradually fade out and become dull gray.

On the other hand, there are blue-colored domestic fowls, such as the Blue Andalusian (see text, pages 401 and 437) and the Blue Orpington, but no blue pigment is known to exist in the feathers of domestic fowls. The blue color is produced by the black pigment granules being of a peculiar shape and being laid down in such a manner that the color effect is blue instead of black or black and white.

White never exists as a pigment in feathers, and the lack of color appears to be due to innumerable air spaces in the substance of the feather by which the rays of light are reflected and deflected until all color is lost. (For color inheritance of white, see page 399.)

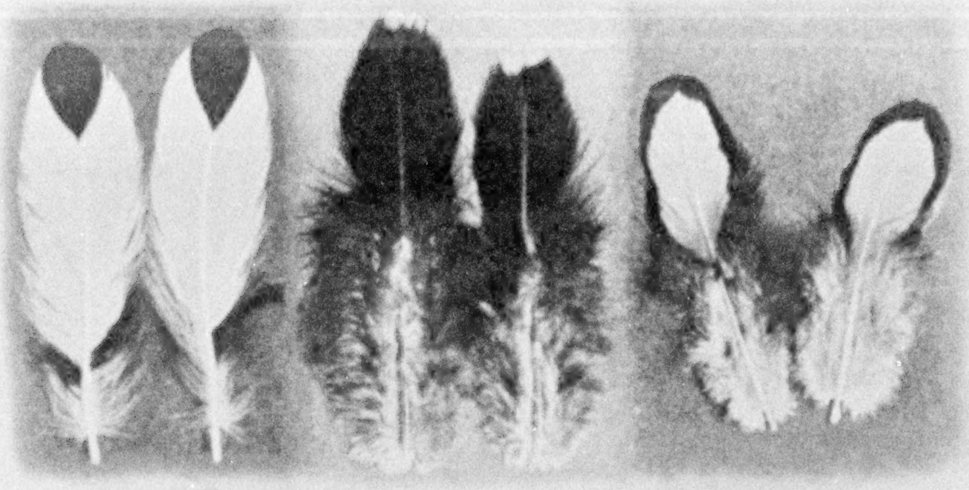
MODERN BREEDS AND VARIETIES

There are comparatively few standard color patterns. For instance, the color



REGULARITY OF MARKING DISTINGUISHES THE PLUMAGE OF MANY BREEDS

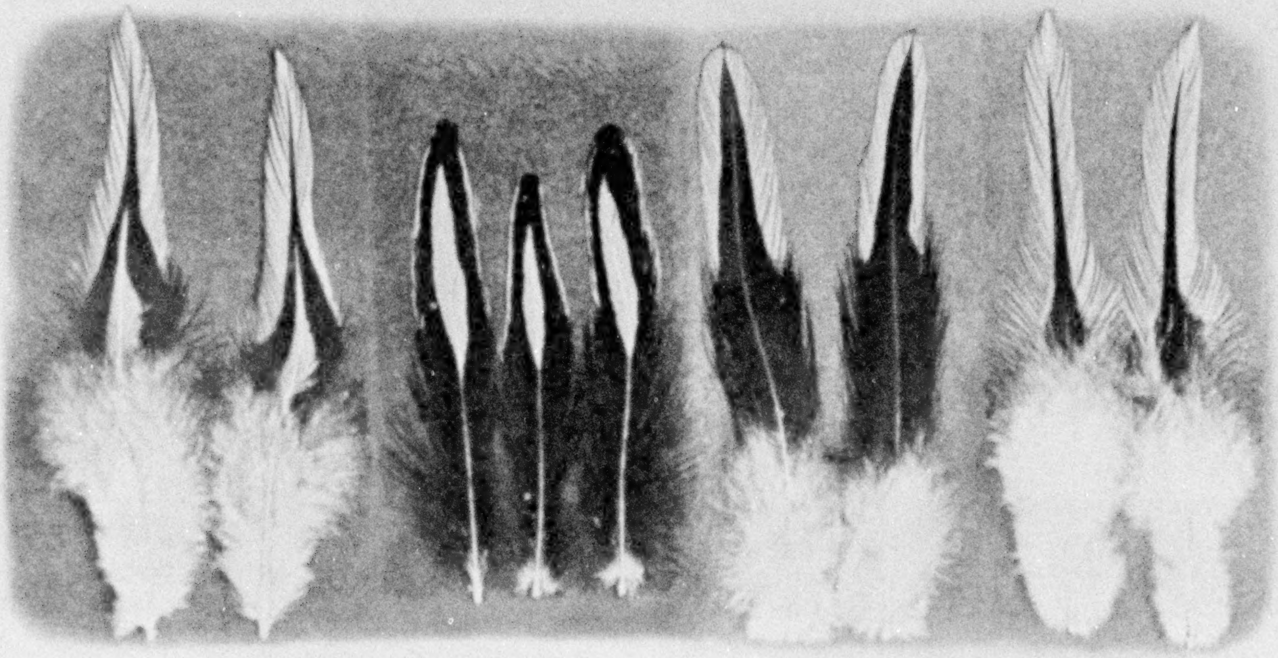
To the novice no less than to the breeder of "fancy" does such lacing and barring appeal for its beauty and its symmetry of line.



Spangling as in Silver Spangled Hamburg . . .

Tipping as in Mottled Ancona . .

Lacing as in Silver Laced Wyandotte . .



A STUDY IN SADDLE AND HACKLE LACING

Saddle of Silver Laced Wyandotte Male . . . .

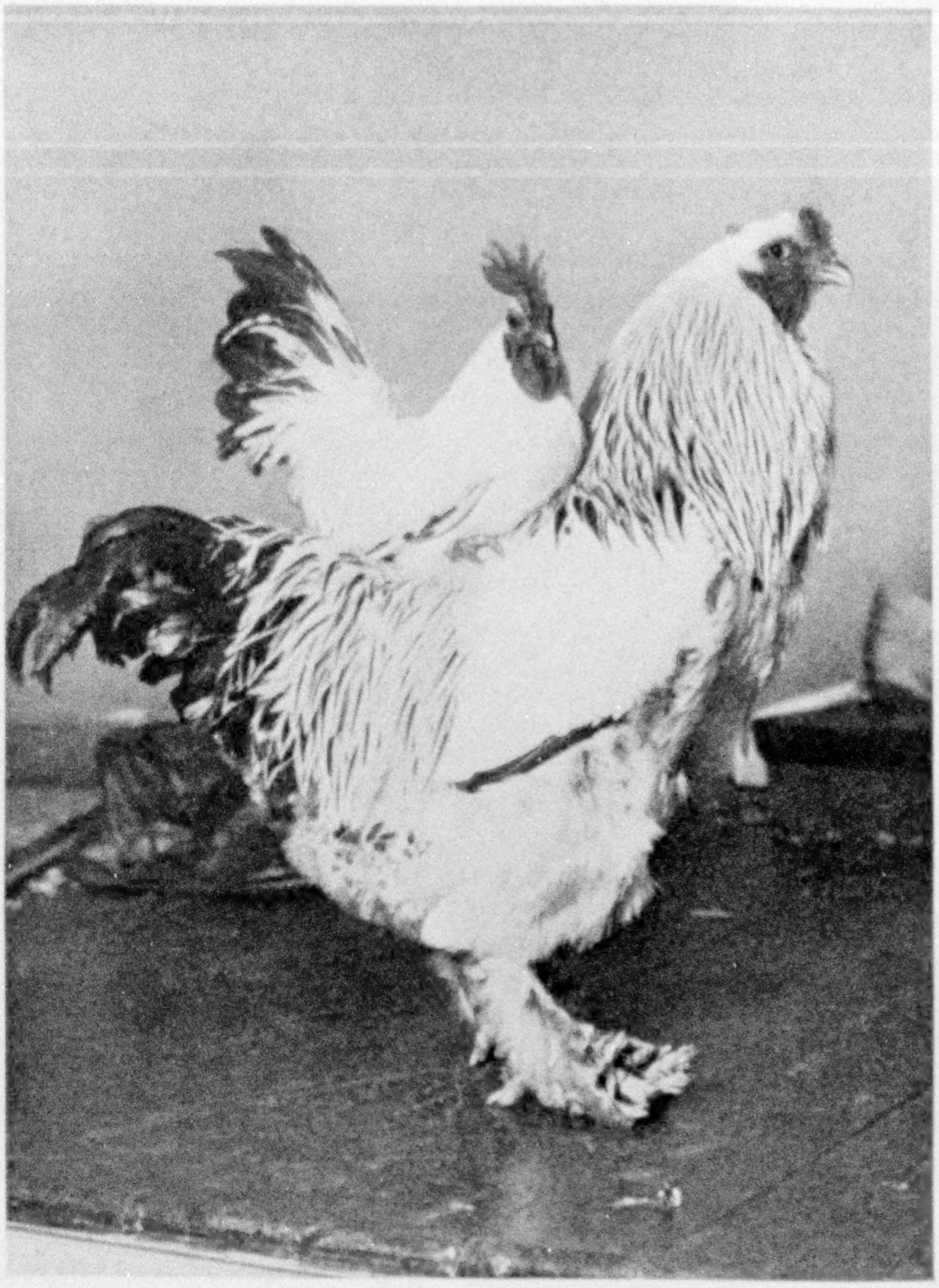
Hackle of Silver Polish Female . .

Hackle of Dark Brahma Male . . .

Saddle of Dark Brahma Male . . .

BOTH SHAPE AND COLOR OF FEATHERS PRESENT ENTRANCING FIELDS FOR STUDY

The bird of iridescent plumage has feathers which form miniature prisms, breaking up rays of light into the beauties of the spectrum.



Photograph by Pacific and Atlantic

A BLACK TAILED JAPANESE ROOSTER ASTRIDE THE BACK OF A BIG LIGHT BRAHMA (SEE COLOR PLATES IV AND XIV)

The smallest and the largest exhibits at a recent poultry show in Madison Square Garden, New York City. The standard Brahma cock weighs 12 pounds; the Bantam tribe averages 22 ounces.

The plumage patterns, for the most part, are determined by the manner in which the pigment is laid down in each particular feather, so that it becomes necessary to consider the individual feather markings when discussing the manner in which the various color factors are inherited from generation to generation.

The irregularly barred feathers of the early Dominique (Color Plate III) have been developed into the remarkable parallel barring of the modern Barred Plymouth Rock (Color Plate VIII). In this case the black pigment granules are laid down in parallel bars on what would otherwise be white feathers.

The Silver Campine (Color Plate VII) is another barred bird, but in this case the black bars are much wider and more irregular than in the Barred Plymouth Rock (see pages 388-389).

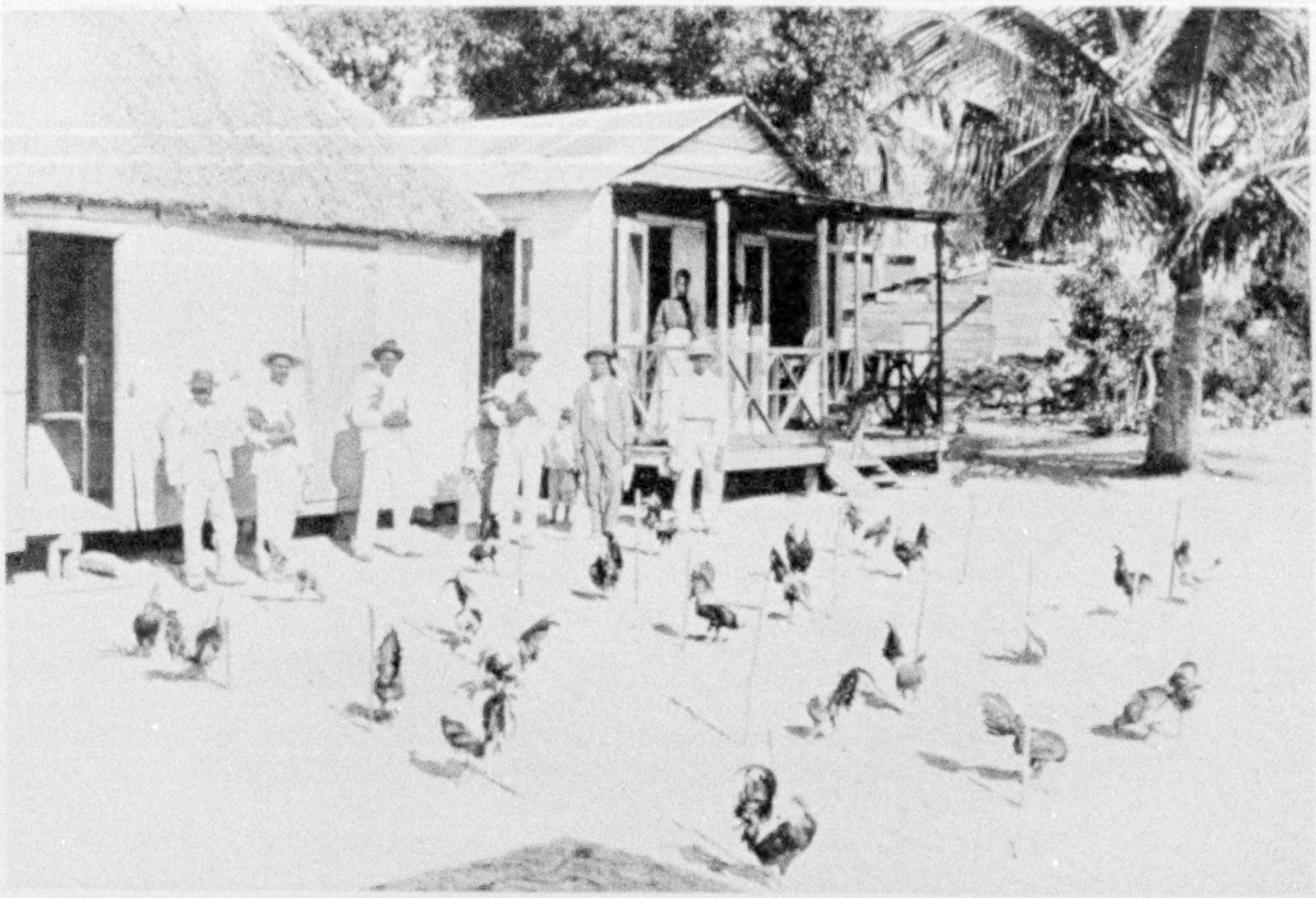
pattern of the Dark Brahma of the Asiatic breeds is almost identical with the color pattern of the Silver Penciled Plymouth Rock and the Silver Penciled Wyandotte, the last two being American breeds.

So, also, the plumage pattern and feather marking of the Partridge Cochin are identical with those of the Partridge Plymouth Rock and Partridge Wyandotte (see Color Plate IX). There are white and there are black varieties of many breeds, the color in each case being identical. The difference of breed lies in shape or type.

In both breeds there is a definite factor which determines the manner in which the pigment is laid down.

There is also another factor which provides the feathers with pigment, this being called the silver factor. Both of these are inherited in a definite manner, which will be discussed presently (see page 395).

The Golden Campine is also a barred bird, but in this case the black bars are alternated with bars of golden bay, the latter taking the place of the white in the Silver Campine. In the Golden Campine, therefore, there is a factor for barring inherited in a definite way and there is also the golden factor.



Photograph from N. H. Darton

COCKFIGHTING IS STILL A POPULAR PASTIME IN PORTO RICO AND GAME BIRDS ARE TRAINED WITH GREAT CARE

Many other color characteristics of the feathers of various breeds might be mentioned, as, for instance, the mottling of the Anconas (Color Plate VI), where the black feathers are tipped with white; spangling in the Silver Spangled Hamburgs (Color Plate V), where the white feathers end in a relatively large black spangle. Then there are black feathers that have white lacing, as in Silver Laced Wyandottes (Color Plate IX), and white feathers that have black lacing, as in the Silver Polish (Color Plate XII).

There are also feathers that have double penciling, as in the Dark Cornish (Color Plate XI), and triple penciling, as in the Partridge Wyandotte (Color Plate IX).

Many other feather-color characters, as determined by the structure of the pigment, might be discussed, but what has already been said will suffice.

Many breeds of domestic fowl possess external appurtenances which are in no way associated with functional activities and apparently serve no particular purpose in reproduction. For instance, there are the crests and beards possessed by many of the Continental breeds and varieties (see diagram of fowl, page 387). Some breeds have single combs, some have rose combs, and some pea combs, while still others have walnut combs, leaf combs, as in the Houdan (Color Plate X), and strawberry combs, as in the Malays (see picture of combs, page 450).

Then there is the distinct type, characteristic of each breed, which is inherited with a considerable degree of regularity.

The shank color of the domestic birds varies considerably; the American breeds have characteristic yellow shanks, while breeds from other countries may have yellow, white, black, or willow-colored shanks, the difference in color being determined very largely by the nature and amount of pigmentation in the epidermis and the dermis.

Some breeds, like the Brahmas (Color Plate IV) and Faverolles (page 398), have feathered shanks, while representatives of many other breeds inherit shanks that are entirely free from feathers.

The problem of paramount interest in a study of poultry is to determine how characters are inherited from generation to generation.

Photograph by A. W. Cutler

A CHICKEN WAGON ARRIVES IN MARKET AT HAVANA, CUBA

Photograph by Clifton Adams

CHICKENS FOR SALE IN MEXICO CITY

Photograph by Kerny Istvan

A HUNGARIAN PEASANT DISPLAYS A FOWL AT A WEDDING

Photograph by Melville Bell Grosvenor

TESTING EGGS IN THE MARKET AT SÃO PAULO, BRAZIL

Photograph by Donald McLeish

GRADING AND PACKING EGGS FOR EXPORT IN A DANISH FACTORY

Coöperation and standardization are largely responsible for Denmark's remarkable success as a poultry-producing nation. The country is divided into egg-collecting areas, and each coöperator stamps the eggs with its date and his number. The eggs are sorted by weight, and traveling agents forward them to head depots or clearing houses.

The wild fowl of the bamboo jungles of India and Ceylon has a single comb, and it is very interesting, therefore, to speculate how the Wyandottes and the Hamburgs came to have rose combs, which character is dominant to the single-comb character (see page 401).

It is also interesting to speculate where the feathered shanks of the Asiatic breeds came from, and how the Sultan (see page 447) got its vulture hocks. Another fascinating problem is the origin of the pigmented skin of the Silkie (Color Plate XIII).

Why do some breeds lay brown-shelled eggs and others white-shelled eggs?

And, again, how is it that the Araucana (Color Plate XIII), found in South America, lays a blue-tinted egg?

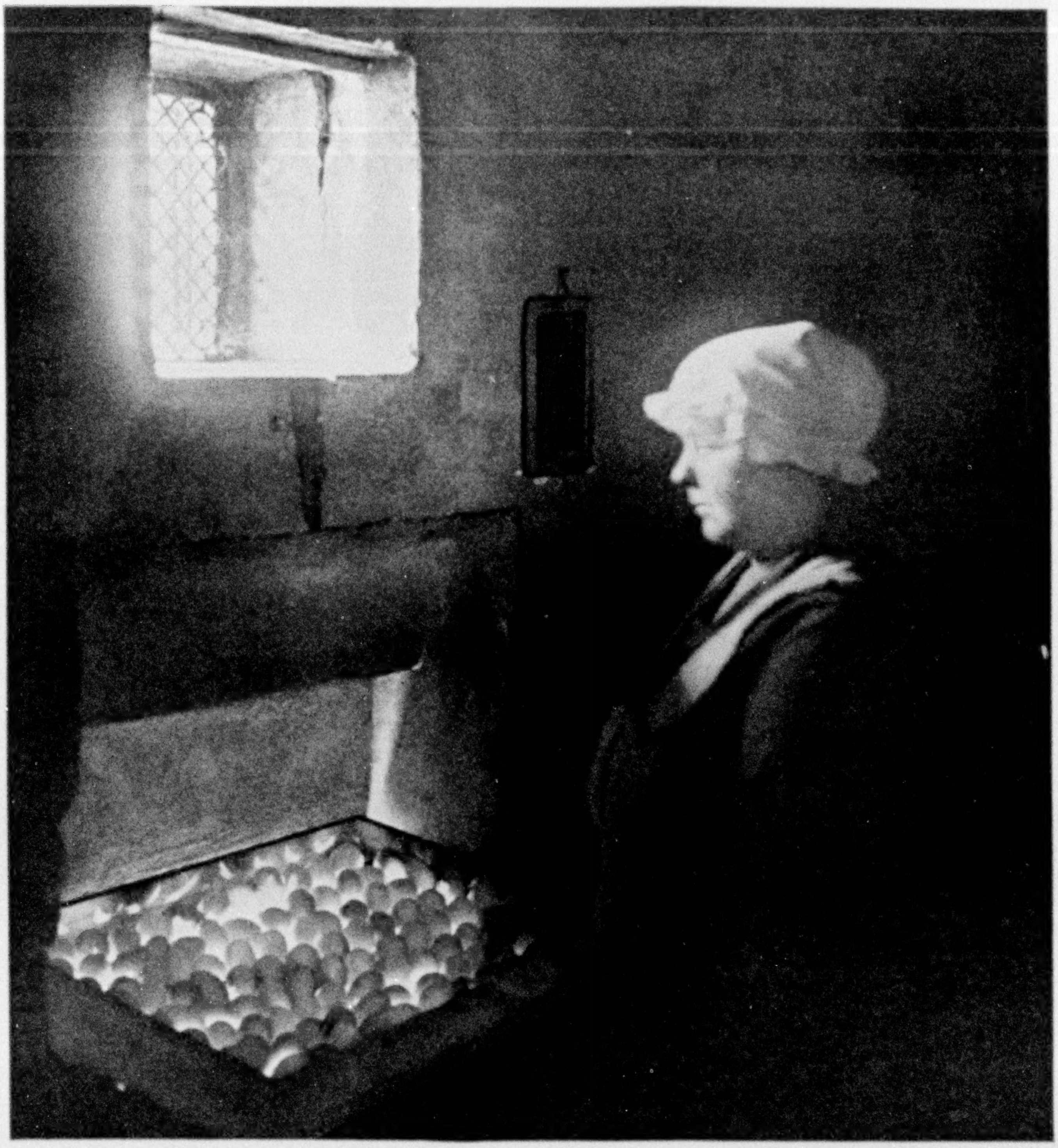
THE SIGNIFICANCE OF MATING

Figuratively speaking, there are a hundred and one questions which might be asked concerning the origin of numerous characters possessed by the domestic fowl.

One way to answer each question is to mate a bird possessing a certain character with another bird which does not possess it and study the offspring of the first and succeeding generations. This is essentially the method of the experimenter, and by following it a great deal of interesting information has already been secured concerning the inheritance of many characters possessed by "biddy" and her mate.

The mating of two individuals that occurs in almost all organisms is one of the most extraordinary processes in Nature, for there is hardly another phenomenon in biology that so alters the whole face of things. Biology would indeed be a relatively simple subject if there were no periodic union of diverse individuals, with the accompanying processes of mating, fertilization, and development.

A picture of what happens in poultry will make the matter clear. Mating here involves two individuals that we call male and female, spermatozoa and ova—germ cells. But this is not all.



Photograph by Donald McLeish

TESTING THE QUALITY OF A HATCH OF EGGS BY TRANSMITTED LIGHT: DENMARK

Produce from many farms passes through this Odense collecting depot and clearing house and any departure from the high average standard is carefully recorded against the coöperator concerned.

After two germ cells, male and female, have united to form one new double cell, the final mating, which is to determine all the characters of the offspring, occurs within this new double cell.

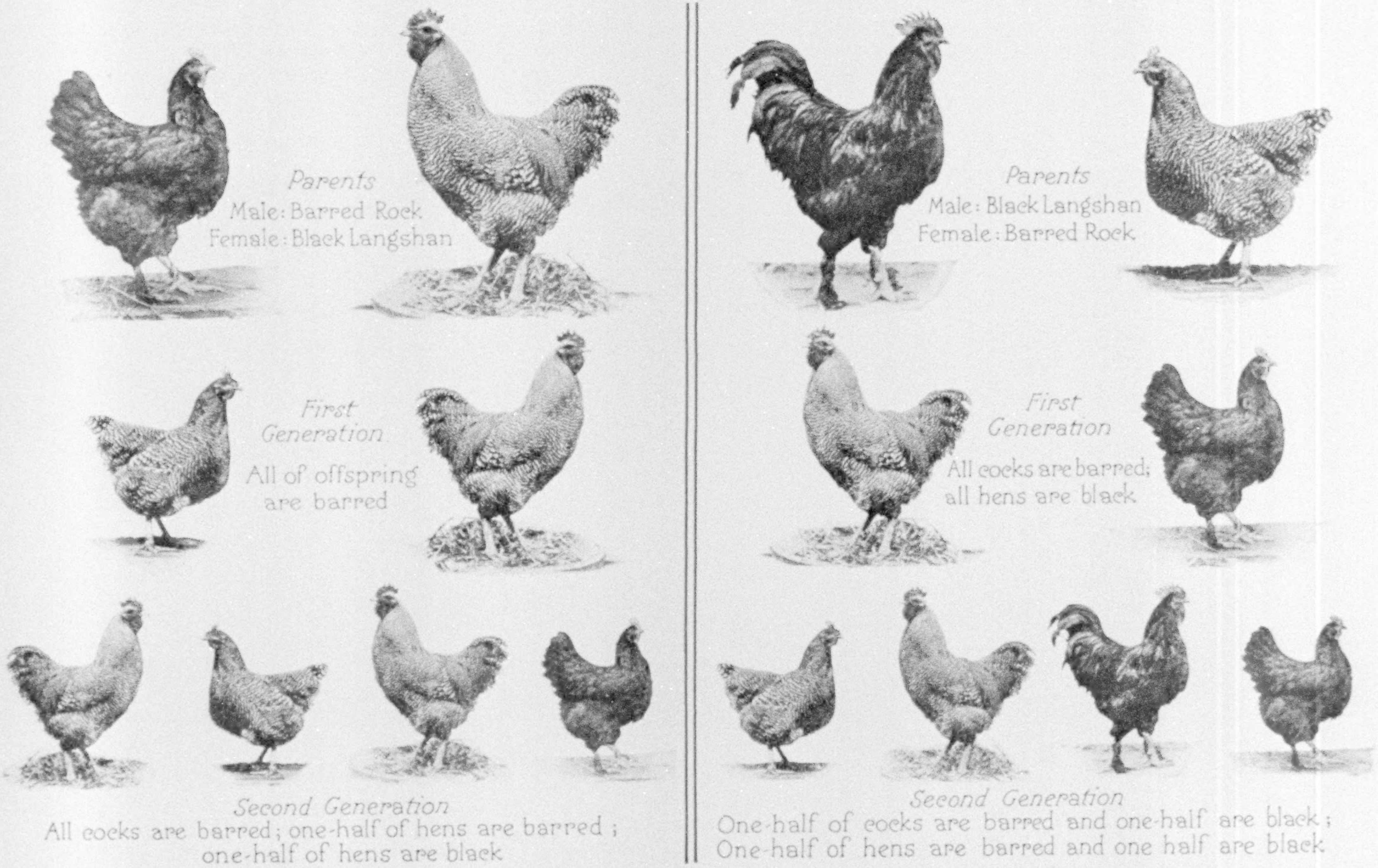
It is easy to understand what transpires if one remembers that each of the two original germ cells from the parents is a tiny bundle containing many pairs of small visible packets of chemicals—the chromosomes. These chromosomes carry all the inherited characters of both parents, and the manner in which the two sets of chromosomes—one set from the male parent and one set from the female parent—combine in the new double cell determines the visible characters of the offspring, such as type of comb, plumage color and pattern, feathering or its absence on the shanks, size of body, etc.

The chromosomes are thus the bearers of heredity and are present in each animal, male and female, in a certain definite manner, stored within the nucleus of the germ

© Theo Moussault

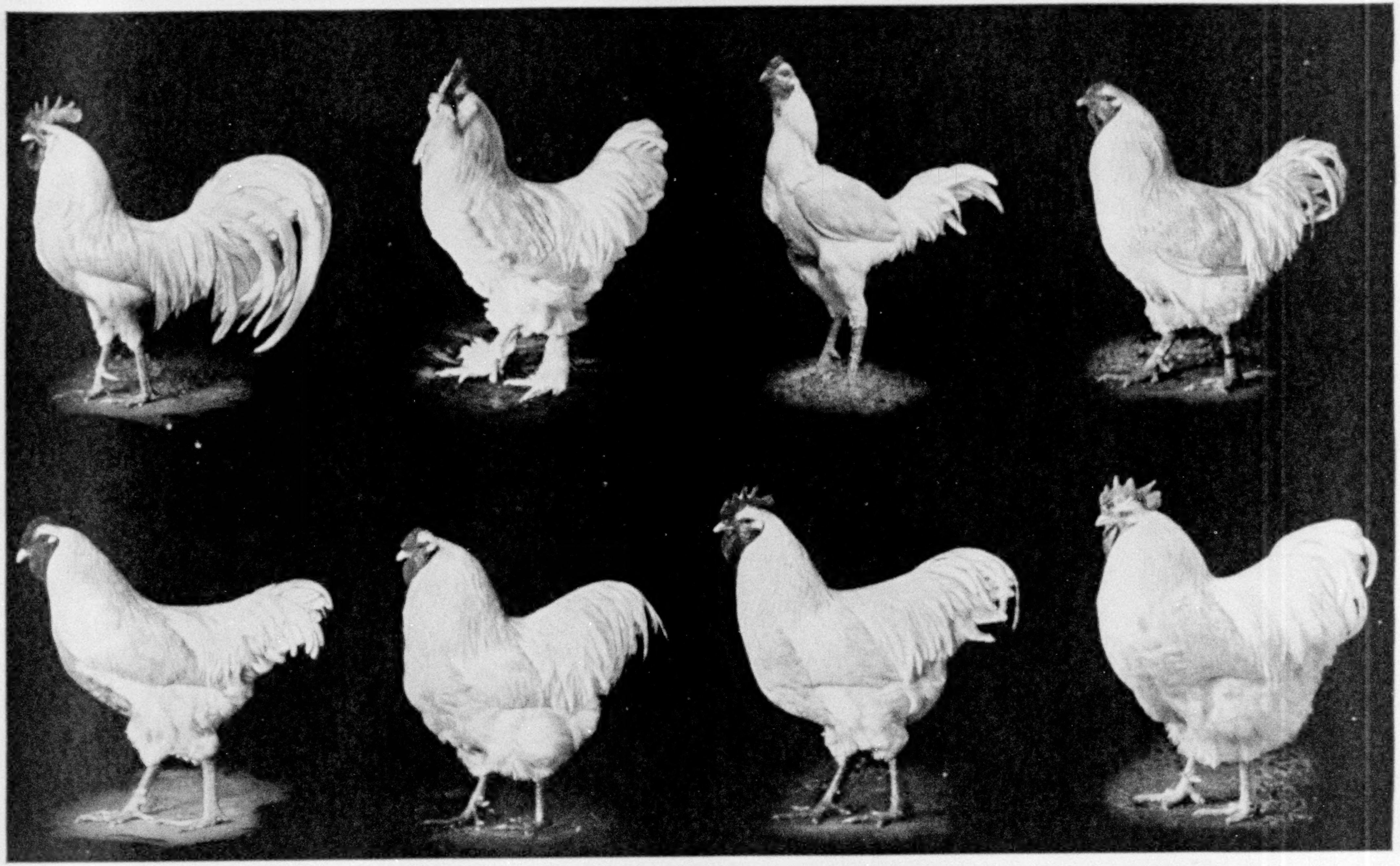
A BARNYARD IN THE NETHERLANDS

Among the five breeds of chickens which have been developed by the Dutch, two have given rise to modern breeds which have become popular in England—the Penciled Hamburg and the White-crested Black Polish.



THIS ILLUSTRATION OF SEX-LINKED INHERITANCE SHOWS THE CURIOUS RESULTS THAT ALWAYS OCCUR IN CERTAIN CROSSES

It will be observed that in the mating on the left the barred cock has transmitted his barred character to all his daughters, sons and grandsons, and to one-half of his granddaughters, whereas the black hen has transmitted her color to none of her sons, daughters, or grandsons, and to only one-half of her granddaughters; but in the mating on the right all the pullets of the first generation are black and all the cocks are barred. The breeder, who knows the mode of inheritance of certain color factors, can mate his birds in such a manner as to distinguish the sex of his chicks as soon as they are hatched. This recognition, if he desires to raise pullets for laying, enables him to kill the cockerels at once, which saves him the expense of feeding and caring for them until their sex is revealed by feather development (see, also, page 399).



AN INTERESTING COMPARISON OF THE BODY TYPES OF EIGHT MODERN BREEDS OF FOWL

Left to right, *upper:* Leghorn (page 416), Faverolle (page 437), Cornish (page 440), Chantecler (page 451). *Lower:* Rhode Island White (page 450), Wyandotte (page 448), Plymouth Rock (page 445), Orpington (page 441). To the eye, these whites are all alike in color, but some of them are genetically different in inheritance (see page 399).

cell. The chromosomes are always in pairs.

Wishing to avoid being too technical, I shall explain the fundamental principles of heredity by a simple illustration.

THE INHERITANCE OF CHARACTERS

If we take a Rose Comb Black Bantam of either sex and mate it with a Rose Comb White Bantam of the opposite sex, the offspring are all black. In the following year, if we take a male of the offspring and mate him to full sisters, they produce black chicks and white chicks in the proportion of three black ones to one white one.

Black and white here form an alternative pair of characters, and the reason that the first generation cross is all black is because in this particular cross black is dominant to white.

Now, it will be observed, that when the black male and the black females produced from the original cross were mated together they produced black chicks and white chicks. The appearance of the white chicks in the second generation demonstrates the fact that the chromosomes are borne in pairs (see illustration, page 401).

The Black Bantam of the original cross had two chromosomes, each of which contained genes, or factors, giving rise to black plumage. The White Bantams of the original cross had two chromosomes, each of which contained genes giving rise to white plumage. Each of the offspring of the original cross contained a chromosome from each of the parents, one for black and one for white, but the white was not expressed because black is dominant to white in this particular cross.

When the offspring of the first generation were mated, one of every four of their chicks had two chromosomes for black, two of every four had one chromosome for black and one for white, and one out of every four had two chromosomes for white. The first two groups are black—black being dominant to white—and the last group is white and breeds true white offspring always when its members are mated among themselves.

This illustration of the inheritance of plumage color in a particular cross is a simple case of Mendelian inheritance. The case has been discussed in detail because, as far as we know, there may be no inheritance other than Mendelian, and an understanding of the mechanism of inheritance is important before real progress in breeding for increased egg production or many other things can be achieved.

The case of sex-linked inheritance is more complex, but still follows the fundamental principle of Mendelian inheritance.

If a Black Langshan female (Color Plate XI) is mated to a Barred Plymouth Rock male (Color Plate VIII) the offspring are all barred, since the factor for barring is dominant to black. When the barred offspring are mated among themselves they produce chicks in the proportion of three barred to one black. All of the males are barred, while one-half of the females are barred and one-half are black.

But if a Black Langshan male is mated to a Barred Plymouth Rock female, the male offspring are all barred and the female offspring are all black. When these offspring are mated among themselves one-half of the male chicks are barred, one-half are black and one-half of the female offspring are barred and one-half are black (see illustration, page 397).

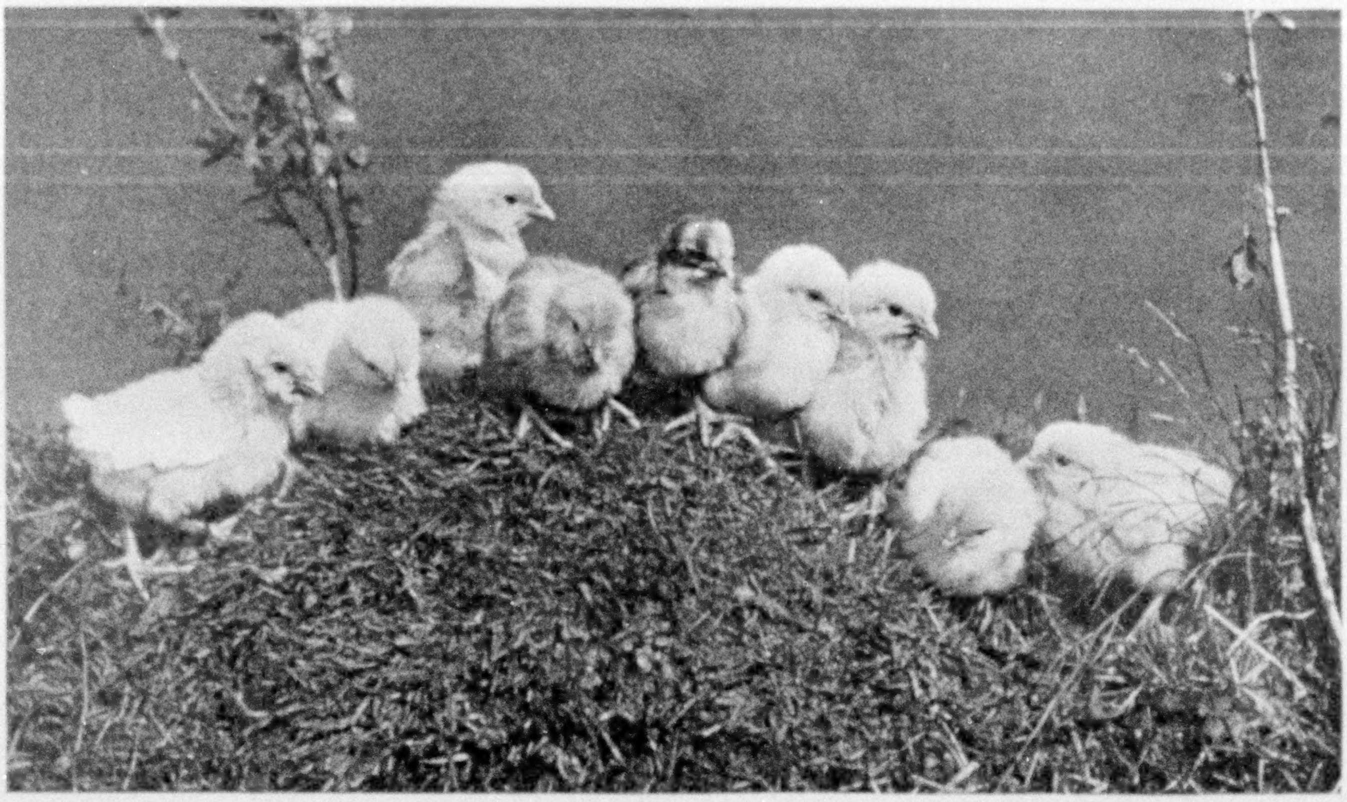
It is seen, then, that the result in the second generation depends entirely upon which sex of the original cross contained the barring pattern.

DIFFERENT KINDS OF WHITE

All white chicks are regarded alike by the average person, but the geneticists who have studied the inheritance of white in poultry have found that any two white chickens may differ very materially in the manner in which white is transmitted from generation to generation, depending upon the breeds to which each one is mated.

Dunn reports, for instance, that there are several genetically different kinds of white, some of which are as follows:

1. The white of White Leghorns (also found occasionally in other white varieties into which it has been introduced by crossing), which prevents any other color from showing in offspring when either male or female parent is a White



Photograph by William Reid

CHICKS FROM THE HIGHLANDS OF SCOTLAND

Of the three breeds of fowls developed in Scotland, only one, the Scotch Gray, has attained any importance (see text, page 443).

Photograph from Ernest Peterffy

A "FEEDING CHICKENS" LESSON IN A GERMAN FARM SCHOOL FOR GIRLS

In order to provide instruction for young women who have had no practical training in farm management, the German Government has established three schools for farming for girls. Those who take the two-year course at any of them are fitted for positions as farm managers.

Leghorn. For instance, if we mate a White Leghorn of either sex to a Barred Rock, or Rhode Island Red, or, as far as we know, any other breed, all offspring will be white; but in the second generation only three-quarters will be white.

2. The white of Silkies and White Rose Comb Bantams, which variety of white is recessive to color—that is, if a White Silkie or White Bantam is mated to a Black Bantam all progeny of the first generation are black. The second generation contains three black to one white.

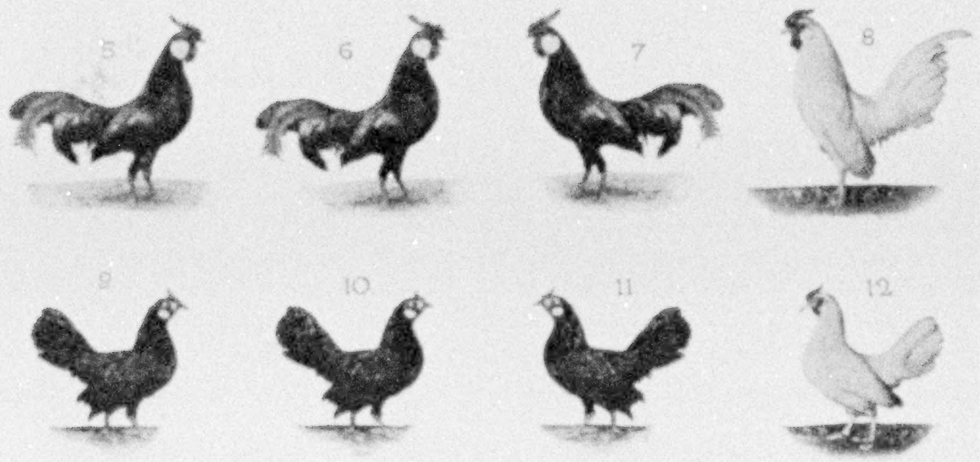
3. The white of other white varieties, such as White Wyandottes, White Rocks, White Minorcas, etc., which is also recessive to color, but distinct from the second or Silkie type of white, since colored chicks are produced by crossing these two types of white—for instance, the Silkie with the White Wyandotte.

Rose Comb Black Bantam, No. 1, and Rose Comb White Bantam, No. 2, represent the parents, and it should be pointed out that it makes no difference which sex is black or which is white; the result in the second generation would be the same.

All of the sons and daughters of the parents are black, as, in this particular cross, black is dominant to white.

If the males and females of the first hybrid generation, Nos. 3 and 4, are bred among themselves, they produce six black to two white birds, Nos. 5 to 12, inclusive.

The number of white chickens in this cross is always in the proportion of one white to three blacks, and is readily demonstrated in breeding practice, providing enough chicks are hatched.



A SIMPLE ILLUSTRATION OF MENDELIAN INHERITANCE

(SEE PAGE 399)

The results secured by Dunn and others demonstrate most clearly that color pattern or type of feather marking and the various colors are inherited in a definite manner in relation to each other (see, also, interesting color inheritance of Blue Andalusian, page 437).

SHAPE OF COMB IS VALUABLE HEREDITY KEY

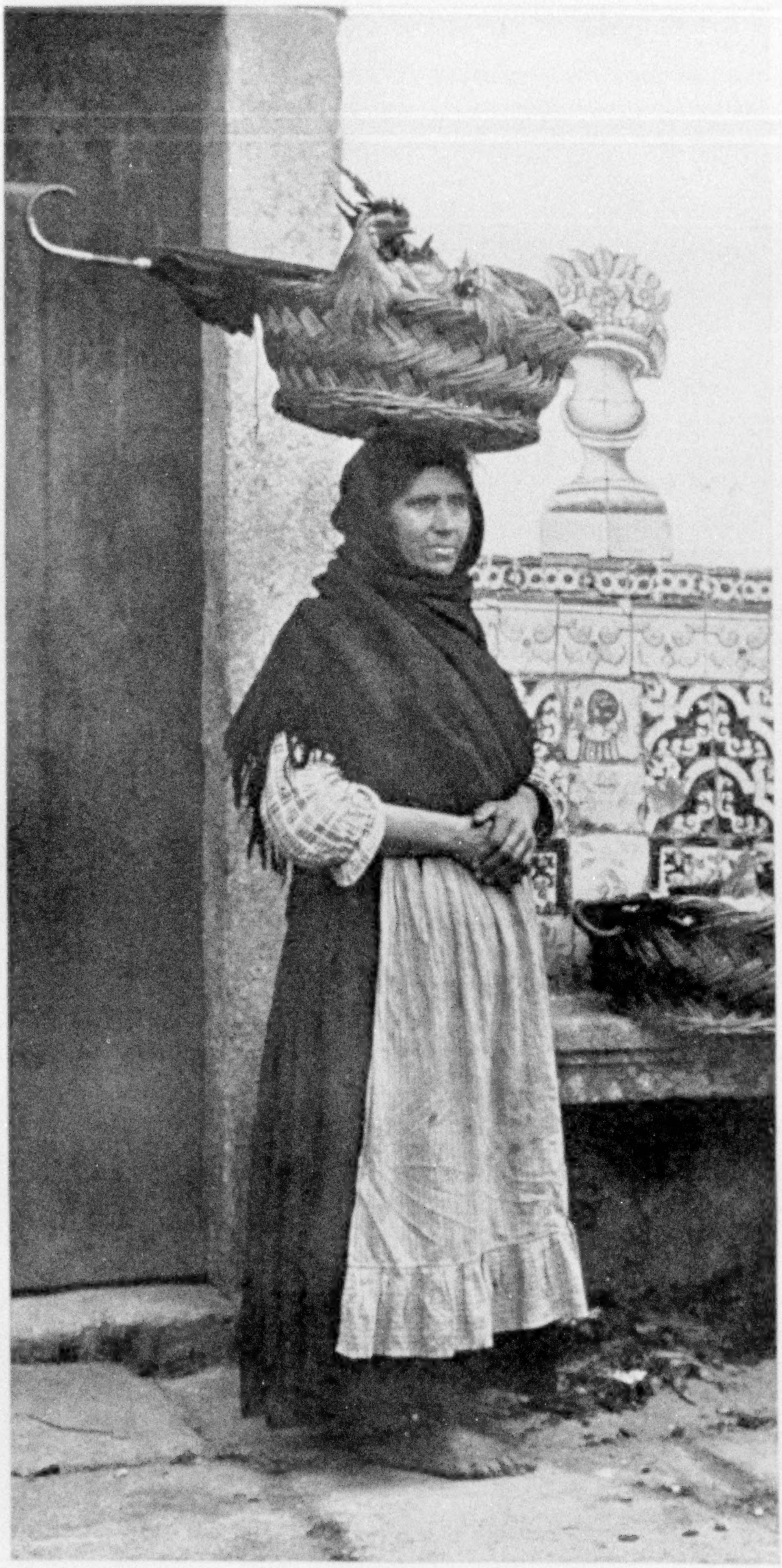
The inheritance of certain structural features in the domestic fowl has proved to be a very fascinating problem.

The shape of the comb was one of the first problems to be studied, and it was found that when a single-comb bird was mated with a pea-comb bird the progeny all had pea combs, and if males and females of the progeny were mated among themselves there occurred in the second generation birds with pea combs in the proportion of three to every bird that had a single comb (see picture of combs, page 450).

So, also, if a bird with a rose comb is mated with a bird with a single comb, the offspring all have rose combs and the second generation have rose and single combs in the proportion of three to one.

In both of these cases, therefore, the pea comb and the rose comb are said to be dominant to the single comb, and each character is determined by a pair of genes or factors transmitted from generation to generation in a definite Mendelian manner.

The situation is complex, however, for if the pea-comb bird is mated to a rose-



Photograph by A. W. Cutler

PEDDLING POULTRY IN PORTUGAL

This barefoot woman of Vianna do Castello, a town of northern Portugal, carries her umbrella with her chickens, on her head. The fowls of the Iberian Peninsula have never attained the degree of popularity won by their cousins of Italy (see text, page 420).

comb bird then the progeny have what is called a walnut comb. This peculiar type of comb is due to the simultaneous presence of both a rose- and a pea-comb factor. Walnut comb is dominant to single comb.

If males and females having walnut combs are bred among themselves their progeny will be in the proportion of nine with walnut combs, three with rose combs, three with pea combs, and one with a single comb. Here, again, the inheritance of such a simple character as shape of comb follows the Mendelian scheme.

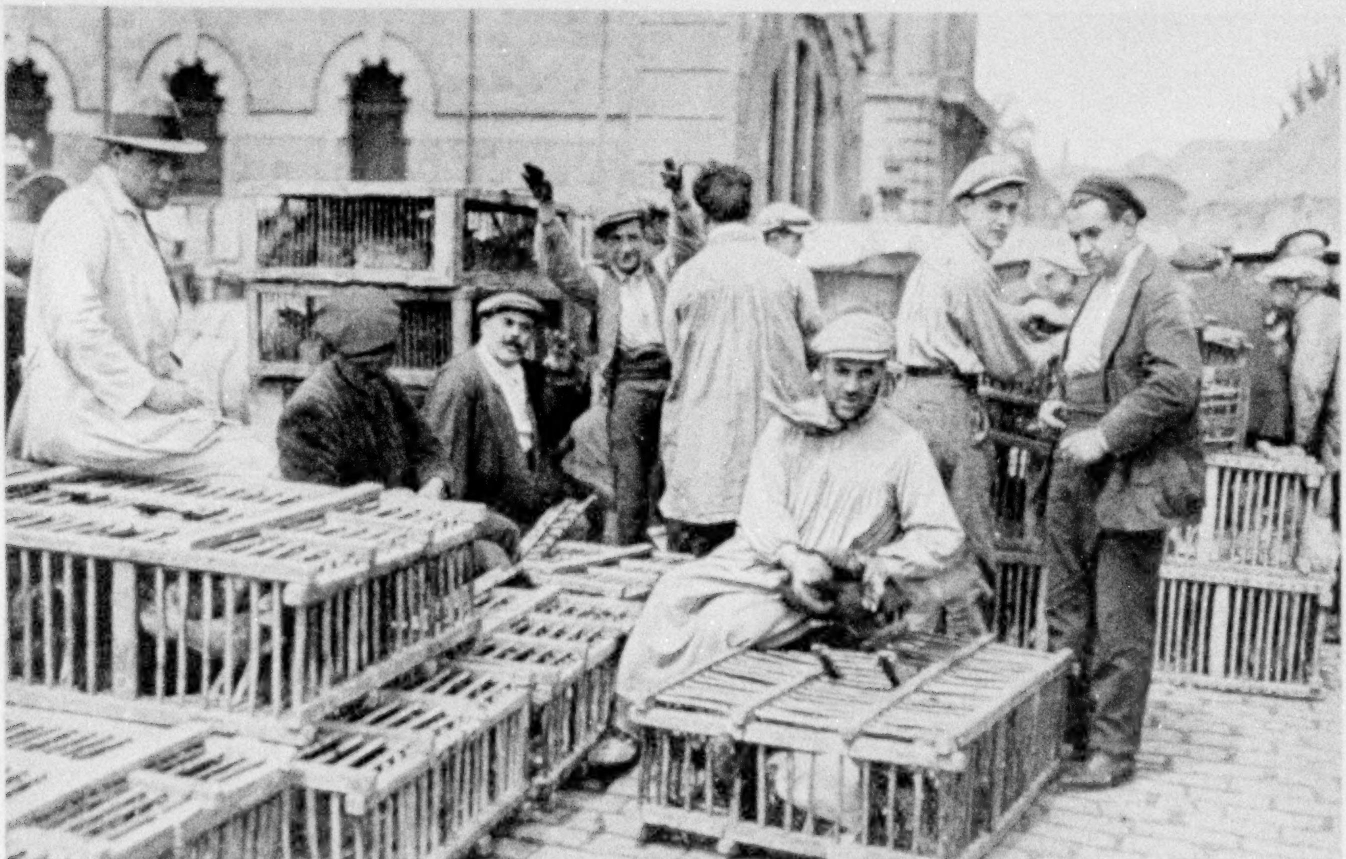
UNIQUE CHARACTERS ARE SOMETIMES RECESSIVE

Silkie feathering, as found in the breed called Silkie (Color Plate XIII), is recessive to normal feathering—that is, if a Silkie is mated to a normal-feathered bird, the progeny are all normal feathered—but if the progeny are bred among themselves they will produce birds having normal feathers and others having Silkie feathers in the proportion of three to one (see page 452).

But the unique frizzled character, as possessed by the breed called Frizzles (Color Plate XII), is dominant to normal plumage, so that if a bird with frizzled feathers is mated to one with

Photograph by A. W. Cutler

A SICILIAN PEASANT WOMAN AND HER CHICKENS, WITH BABY IN HER FRAME



THE CHICKEN MARKET OF BARCELONA

Spanish breeds of fowl have the same general characteristics which distinguish the Italian breeds; the former, however, are somewhat larger birds.

© Donald McLeish

A WHITE LEGHORN FOR SALE: AOSTA, ITALY

Domestic fowls have been raised in Italy for twenty-five centuries, and it is probable that the Romans were the first people to recognize the value of fowl flesh for food.

EGG MARKETING IN A RUMANIAN VILLAGE

Photograph by A. S. Iddings

POULTRY PEDDLERS OF PATRAS, GREECE

While the cock has no place in Grecian mythology, distribution of domestic fowls among Phœnician cities is credited to the ancient Greeks.

EGGS FROM SAMSUN, TURKEY, DESTINED FOR EUROPEAN BREAKFAST TABLES

Photographs by Maynard Owen Williams

BOATLOADS OF EGGS AT SAMSUN READY TO BE TAKEN ABOARD A BLACK SEA VESSEL

The eggs are packed end on end in long, shallow boxes resembling bicycle crates (see, also, illustration on opposite page).

Photograph by Maynard Owen Williams

TURKISH STEVEDORES AT SAMSUN DEMONSTRATING THEIR CONFIDENCE IN THE STRENGTH OF THEIR EGG CRATES

The handlers of the fragile product walk carelessly upon the narrow boxes made of thin boards.

normal feathers the progeny all have frizzled feathers.

The presence of a crest is apparently dominant to the absence of a crest, but the situation is complicated to some extent by the fact that the actual size of the crest seems to be determined, to a considerable extent, at least, by the size of the comb.

The vulture hock of the Sultan is recessive to the absence of vulture hocks in all other breeds—that is, in crossing the Sultan with other breeds the vulture hock disappears in the first generation, but in the second generation one out of every four chicks will have the vulture hock.

The very long tail of the Yokohama is apparently dominant to the normal length of tail as found in all other breeds, but it may not be completely dominant. Only a small amount of experimental work has been carried out with a limited number of matings, and thus far it appears that there are modifying factors.

The very peculiar bare-necked characteristic of the Transylvanian Naked Neck Fowl (see page 446) is inherited as a simple dominant to normal feathering—that is, if a Naked Neck is mated to a fowl with feathered neck, all the progeny of the first generation are Naked Necks and in the second generation three out of every

Photograph by Robert F. Fitch

A WAYSIDE SHRINE IN CHINA DECORATED WITH CHICKEN FEATHERS, BLOOD, AND INCENSE

On the right the inscription reads, "May Heaven produce good men," and on the left, "May men accomplish good deeds." An inscription at the top reads, "To prayer there is certain response." The idol within is a local patron, a deified ancestor of note in the community.

Photograph by Ghoshal Brothers

PREDICTING THE FUTURE BY BREAKING EGGS

This East Indian soothsayer employs a *dieng shat pylleng*, or egg-breaking board, with which to tell the fortunes of his clients. After invoking the spirits, he smashes the egg against the board, the large portion of the shell being made to fall in the middle of the board, and being known as the boat; the smaller fragments are good or evil omens, as they fall to the right or left. If four fragments lie around the boat so as to form a square, the patient is at the point of death.

four are Naked Necks and one is feathered.

The presence of feathers on the shanks is dominant to the absence of feathers, but there are probably at least two factors involved. The results of the study of many more characters might be enumerated as convincing evidence of the progress made in the acquisition of our knowledge of heredity in the domestic fowl. Sufficient has surely been presented, however, to demonstrate that an accurate knowledge of heredity in poultry is at least possible.

A study of the mode of inheritance of the more simple and less important characters, such as shape of comb, crest, and feathered shanks, has naturally preceded the study of the mode of inheritance of the more fundamental characters.

That is the way of science: solving first the simpler problems and from the experience obtained proceeding to a solution of more complex ones.

Knowledge gained from the numerous studies involving the inheritance of plumage patterns, feather markings, combs, and crests has paved the way for a better understanding of the mode of inheritance of such characters as body size, body shape, egg production, and constitutional vigor. Considerable progress has already been made in these directions, and with skill in the application of results already known the future holds much in store.

LAYING QUALITIES GREATLY IMPROVED BY BREEDING

During recent years, particularly, there has been a great improvement in the laying quality of chickens in back-yard, farm, and commercial flocks. This improvement is largely the result of careful inquiry by a number of State experiment stations and of a realization on the part of poultry producers of the economic importance of good egg production.

Officially conducted egg-laying contests have been in operation for a number of years, and these have demonstrated the

Photograph by Maynard Owen Williams

A POULTRY RAISER OF FUKIEN PROVINCE, CHINA, TAKES HIS FOWLS TO TOWN

possibilities of improving egg production through proper systems of breeding combined with intelligent selection of the flock.

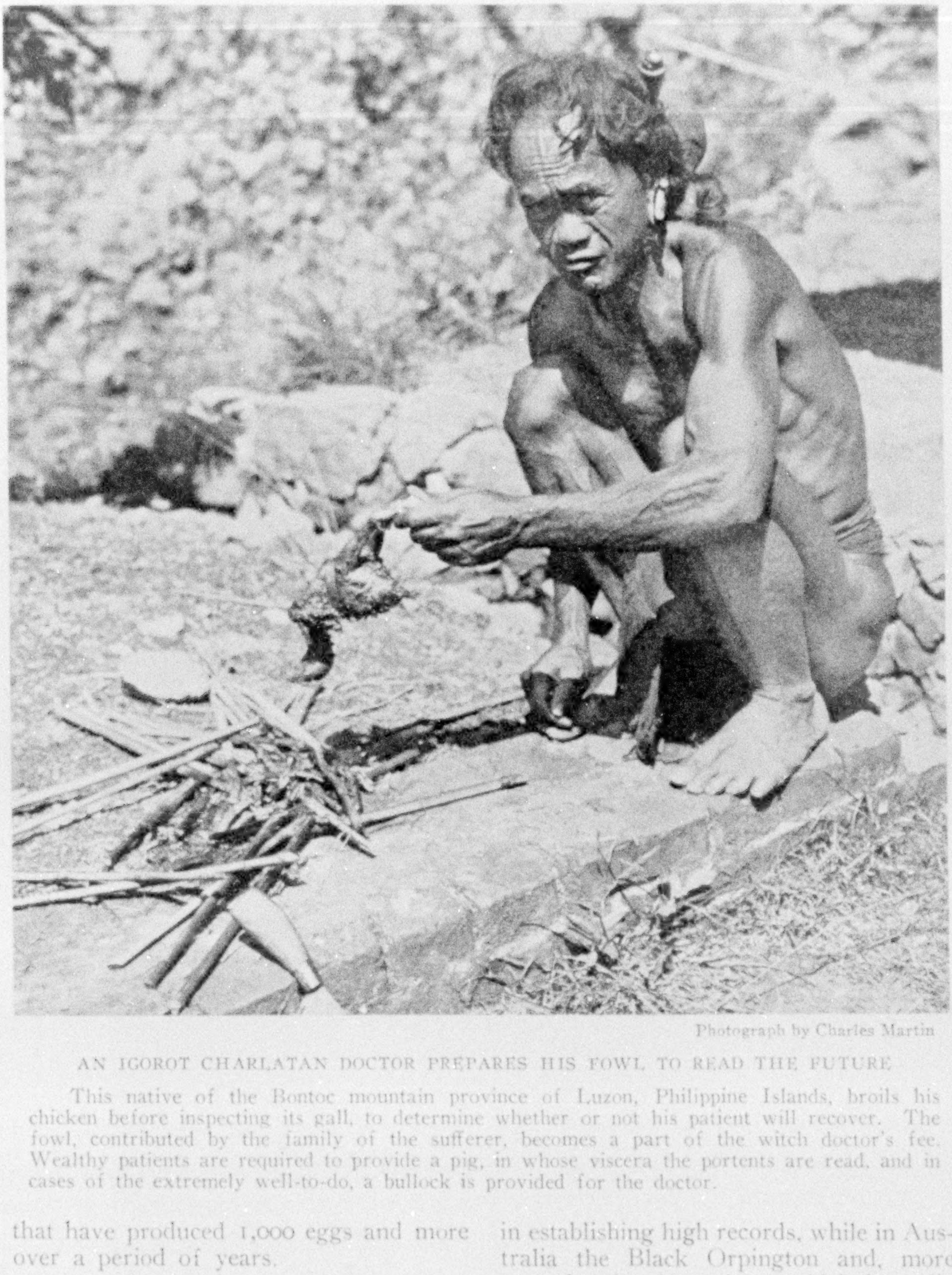
One of the most important factors is the development of early-maturing strains of layers. Pullets which commence laying in from 150 to 200 days after being hatched, as compared with pullets which commence laying in from 250 to 300 days, not only produce more eggs during the most profitable season of production, but also usually tend to lay more eggs per year. Early maturity is an inherited characteristic and can be developed in a strain of fowls by proper methods of selection.

Records of production are interesting in demonstrating what can be achieved with well-bred stock, under the most efficient systems of management.

The poultry extension service of the Connecticut Agricultural College has reported records of production for backyard, farm, and commercial flocks in that State, in which records from 350 flocks, with a total of 88,297 birds of various breeds, showed an average production of 142.58 eggs per bird.

This is almost double the average annual egg production per bird for all the hens of the United States, which is estimated to be about 72 eggs. Numerous records of production of 140 to 160 eggs per hen have been made in several other States.

There are many flocks, small and large, with an average production per bird well over the 200 egg mark. In some flocks breeding for increased egg production has progressed to such an extent that unless one or more 300-egg records are obtained annually the breeder is disappointed. There are not only many 300-egg record hens in the United States, but several



Photograph by Charles Martin

AN IGOROT CHARLATAN DOCTOR PREPARES HIS FOWL TO READ THE FUTURE

This native of the Bontoc mountain province of Luzon, Philippine Islands, broils his chicken before inspecting its gall, to determine whether or not his patient will recover. The fowl, contributed by the family of the sufferer, becomes a part of the witch doctor's fee. Wealthy patients are required to provide a pig, in whose viscera the portents are read, and in cases of the extremely well-to-do, a bullock is provided for the doctor.

that have produced 1,000 eggs and more over a period of years.

ONE HEN LAYS 351 EGGS IN 365 DAYS

Most of the high records in the United States have been made by the more popular varieties, such as White Leghorn, Barred Plymouth Rock, Single Comb Rhode Island Red, and White Wyandotte.

In England the White Wyandotte and the White Leghorn have been preëminent in establishing high records, while in Australia the Black Orpington and, more recently, the Australorp, which is really an Australian-bred Black Orpington, have vied with the White Leghorn in establishing the highest records.

The world's official record for individual production was established in 1926 by a Canadian hen with a phenomenal record of 351 eggs in 365 days. This indeed is a wonderful achievement and

Photograph by Roy C. Bennett

A FLEET OF EGG BOATS SEEN FROM THE GARDEN BRIDGE, SHANGHAI

In China, eggs are carried in open baskets. When Americans entered the wholesale market as buyers of eggs for evaporating, they attempted to introduce egg cases, such as are used in the United States; but the breakage became enormous, as Chinese coolies, unable to read the "HANDLE WITH CARE" signs printed in Chinese on the closed boxes, pitched them about so roughly that the eggs were smashed. The buyers sighed and returned to the use of open baskets. The immense volume of eggs produced by small flocks in China is almost beyond comprehension. American capital has developed an important industry in the collection of these eggs, breaking them and freezing or desiccating the contents. Because of the fact that labor is cheap, the cost of these eggs is very low.

is an authentic record, having been made in an egg-laying contest conducted under the auspices of the Government of Canada, at Agassiz, B. C.

Moreover, that such an achievement was not an accident is borne out by the fact that the pen of ten hens, of which the world-record hen mentioned above was a member, established another official world record by laying an average of 292.7 eggs per hen for the year. This is a practical demonstration of what can be accomplished by good breeding practice in combination with proper management.

ORIGIN OF BREEDS IN MANY LANDS

Historical evidence is very scant concerning the origin of the breeds and varieties in all countries except England and America, and even in these two records are in some cases meager.

Enough information is available, however, to enable us to trace, in a general way, the spread of domestic fowls throughout the world, and to trace particularly the influence of imported strains on the poultry-breeding industry of many countries.

ASIATIC BREEDS

Among the earliest domesticated fowl of which we have any definite record are a number of Asiatic breeds which possess a rather distinctive type and have exercised a tremendous influence in the development of several breeds in other countries. Such extremes as are represented by the Brahma and the Rose Comb Black Bantam (see Color Plates IV and XVI) could each easily have been produced from a common ancestor through continued selection, from generation to generation, of desirable variants.

When it is realized what man has accomplished with many of the breeds and varieties in a comparatively short time, it is not so difficult to believe that the Asiatic fowls have a common ancestor with all other breeds.

Great as has been the influence of some of the Asiatic breeds on the poultry industry in other countries, most of them now have but little significance, either in economic importance or as exhibition fowls.

The Asiatic breeds include the Brahma, Cochin, Langshan, Malay, Aseel, and Black Sumatra, the most important being the first three.

BRAHMA

(For Illustration, see Color Plate IV)

It is fairly definitely established that the earliest Brahma originated in the Brahmaputra district of India, where fowls of the original type are still to be met with and where they are known as Gray Chittagong. Other than this, little is known, except that subsequent to their introduction into China there was considerable improvement in making the type more uniform and in the perfection of the plumage pattern.

Brahmas have exercised a significant influence in the development of English and American breeds. The first Brahmas were imported into America in September, 1846. Apparently, the first importation into England was about 1853, when Queen Victoria was presented with a pen of these birds, which led to their becoming popular.

When first introduced into America and England, the Brahma was reputed to be a good layer. It was a somewhat coarser bird then than now and the plumage coloration was not so clearly defined.

As a matter of fact, modern breeders of the Brahma have developed the color markings to such an extent that the economic qualities have been interfered with considerably.

The Brahmas are massive in appearance, well feathered and well proportioned. The male, because of his size and carriage of body, presents an elegant appearance. One outstanding characteristic of this breed is the presence of a pea comb (with three low serrated crests), found in few others (see illustration, page 450).

There are two varieties of Brahmas, the Light and the Dark, differing somewhat in weight and particularly in plumage pattern.

The standard weights of the Brahmas afford interesting comparison with other breeds. They are: Light Brahma—cock, 12; hen, 9½; cockerel, 10; and pullet, 8 pounds; the Dark Brahma is one pound less in each case, but even then it is larger than the majority of breeds.

In the Light Brahma the plumage is white, the feathers on the hackle and saddle being black narrowly edged with silver white. In the wing the primary feathers are black or black edged with white, while the main tail feathers are black.

In the Dark Brahma there is a sexual difference in color pattern, the male being more variegated than the female. In the male the head, beak, shoulders, coverts, and wing bows are silvery gray; the hackle and saddle feathers are silvery white striped with black in the center of each feather. The plumage in front of the neck is black, as is also the tail.

The color of the female is different. The neck is silvery white, the wing bows are steel gray with soft black penciling; the primaries are black with a narrow edge of steel gray penciling on the lower webs, and the secondaries have the upper webs black and the lower webs steel gray with penciling extending around the outer edge of the feathers. The back is steel gray, like the breast, body, and fluff, while the tail is black except for the two top feathers, these being penciled on the upper edge (see page 440).

COCHIN

(For Illustration, see Color Plate XVI)

The Cochin has lost practically all of its old-time popularity, although it is claimed that this breed, under the name of the Cochin China, probably exercised greater influence in different countries than any other breed. It was early known as the Shanghai fowl, and it seems to

Photograph by Alfred Chial

A FEATHER-DUSTER PEDDLER IN SHANGHAI

have originated in the Shanghai district of China.

The first reported importation of this breed into England took place in 1845 and resulted in a great boom in its favor. Claims were made that the hens laid several eggs a day, that the flavor of the flesh was of the finest, and that it was possible to make a fortune out of this new breed in a comparatively short while. About the same time poultry shows became the resort of society folk, and the Cochins proved to be the center of attraction. After a short time the enthusiasm died down and the breed retired into relative obscurity.

The Cochin's history was somewhat the same in America, and although its popularity was never quite so great here as in England, its blood has been used to a considerable extent in developing new breeds.

The outstanding characteristics of the Cochin are its massive appearance and abundantly feathered shanks. In the female there is a very prominent development of feathers at the base of the tail, and this forms what is called a "cushion."

The feathering of the Cochin is extremely long and profuse, so that the birds appear much larger than is really the case. All Cochins have single combs. The standard weights are the same as those for the Dark Brahmas: Cock, 11; hen, 8½; cockerel, 9; and pullet, 7 pounds.

There are four varieties of Cochins—the Buff, White, Black, and Partridge. The Buff Cochin is an even shade of golden buff in the surface of all sections; the White is pure white throughout, and the Black is black in surface color, with a greenish sheen; the Partridge Cochin has a color pattern in which the sexes differ.

As in the case of the Dark Brahma, the male Partridge Cochin is more highly variegated in color than the female. Its hackle feathers are greenish black, with a narrow edging of brilliant red, and the wings are also red, while the back has brilliant red feathers, each with a greenish black stripe down the middle. The general surface appearance of the bird, therefore, is reddish, while the plumage in front of the neck is black.

In the female the neck is reddish bay, and the front of the neck and breast are both deep reddish bay distinctly penciled with black. The wing bows and back are deep reddish bay penciled with black, so that the bird presents a fairly uniform appearance over all parts of the body.

LANGSHAN

(For Illustration, see Color Plate XI)

The Langshan has characteristics in common with the Brahma and the Cochin in that it is also feathered on the shanks and is fairly massive in appearance but is more upstanding than either of the other two breeds. It is undoubtedly a native of China, apparently having been developed in the Langshan district north of the Yangtze River.

The Langshans were imported into England in 1872, and were later introduced into America. They have been bred to some extent in both countries.

The principal characteristics of the Langshan are the depth of the body, length of legs, feathered shanks, and the high carriage of the tail feathers, the tip of the tail in both male and female being practically the same height as the head, giving the body of the bird a sort of V-shape. The comb is single. In size the Langshan is approximately one pound lighter in standard weights than the Cochin.

There are two varieties, the Black and the White, the standard color markings of which are identical with those of the Black and the White Cochin, respectively.

MALAY

The Malay breed apparently originated in southeastern Asia, and was imported into England about 1830, but did not arouse great interest nor exercise much influence in the poultry-breeding field.

This breed has little to commend it from the economic standpoint. It is rarely seen in America and only a few specimens are to be found in England. In America the color is of a black-red pattern.

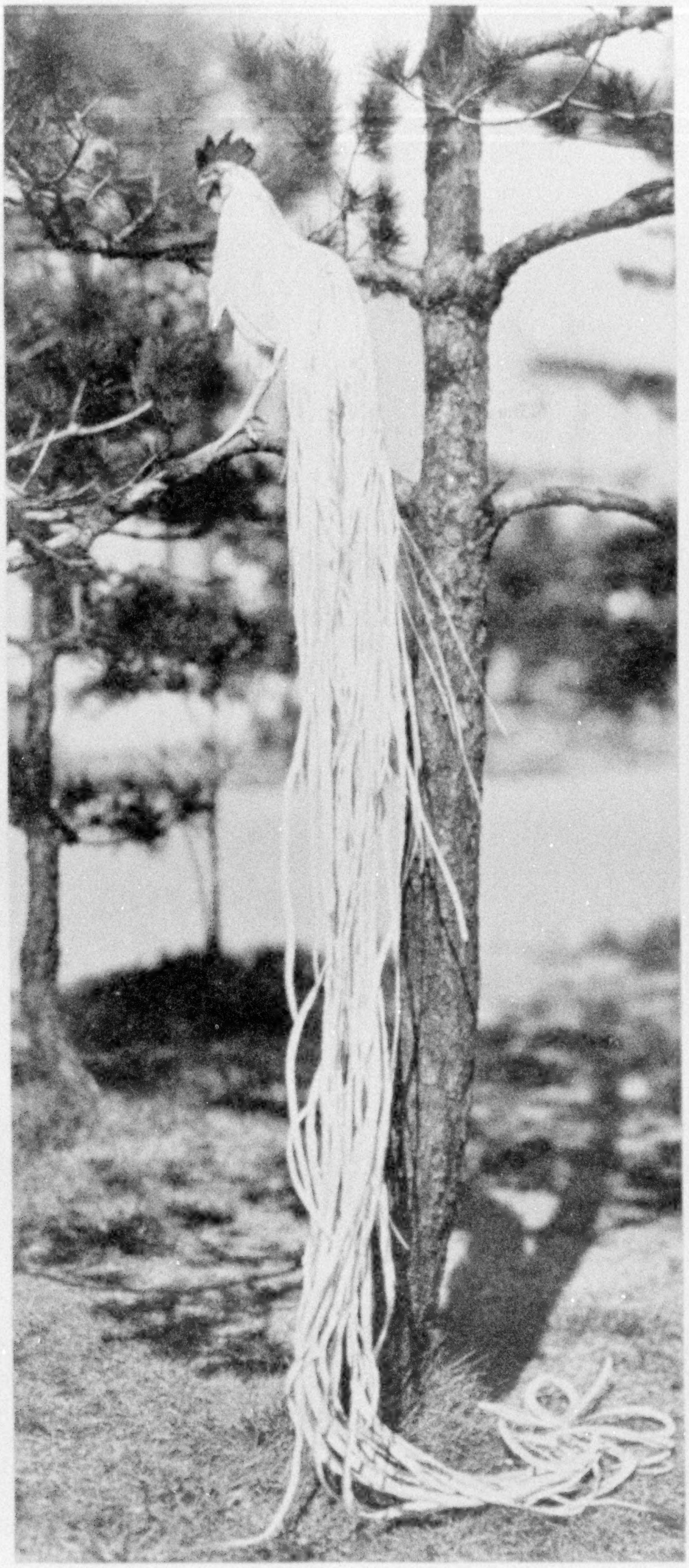
ASEEL

The Aseel has been popularly known as the fighting-game of India, and from the best obtainable evidence it is apparent that it has been bred in India for many generations. It has always been popular with the rulers of India, who kept and trained the birds for fighting purposes and, indeed, it has few other qualities to commend it.

The Aseel is of particular interest from a historical standpoint only, since it is not bred to any extent in Europe or in the New World.

SUMATRA

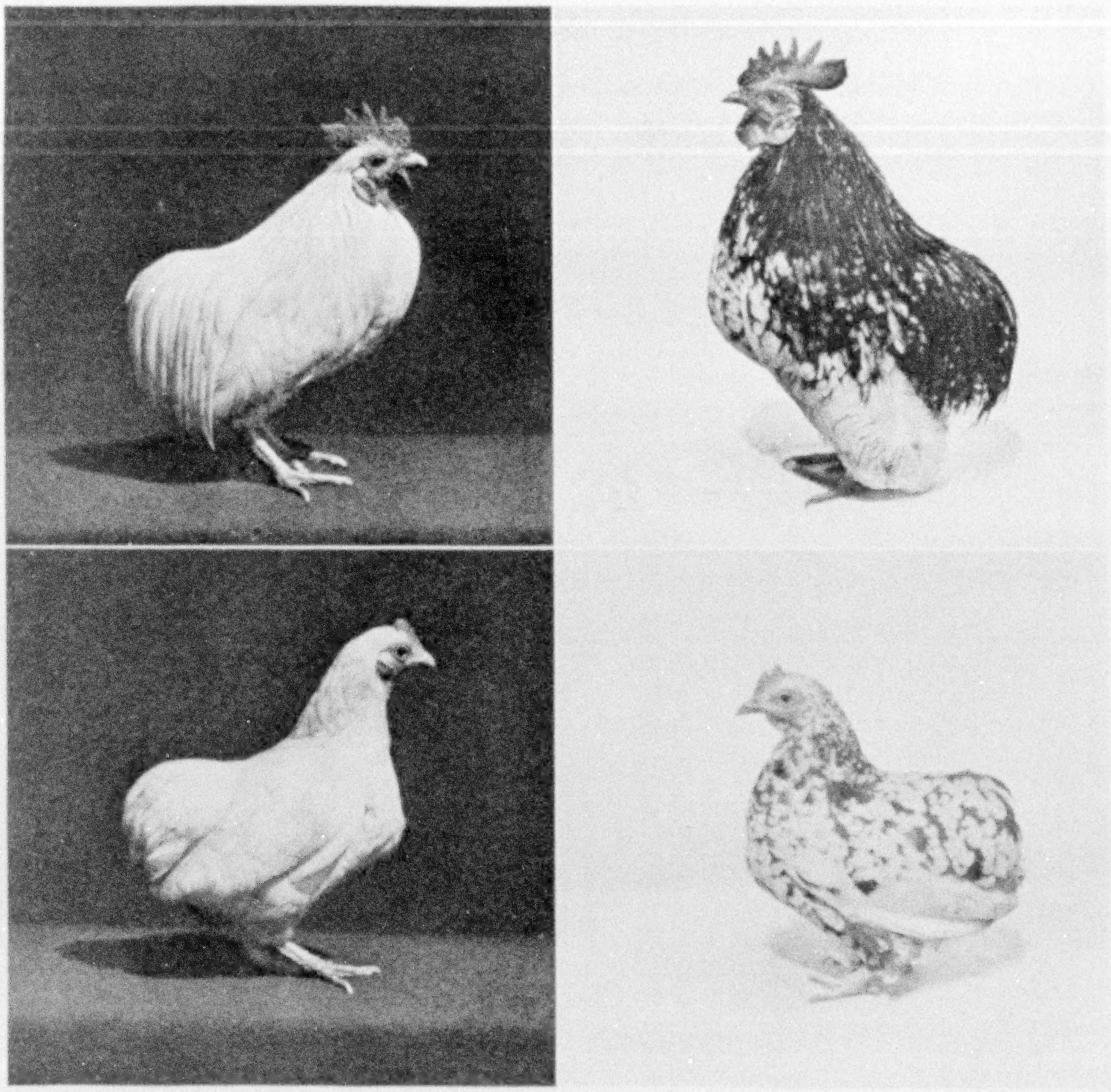
Apparently the original habitat of the Sumatra, popularly known as the Black Sumatra, was the islands of the Asiatic Archipelago, including Sumatra. This breed was imported into America in 1847 and met with a moderate amount of favor. Its advent in England, about the same time, happened just when cockfighting as a public institution was being suppressed. If it were



Photograph by Takanura Mitsui

A JAPANESE COCK WITH 12-FOOT TAIL COVERTS

This Yokohama's four yards of tail is a source of great concern to his owner, who must provide an attendant to hold his "train," so to speak, when he walks abroad for exercise.



Photographs by Takanura Mitsui

FREAKS OF FANCY POULTRY BREEDING IN JAPAN (SEE PAGE 452)

At the left, a Japanese White Quail Bantam cock and hen, with tails entirely undeveloped; at the right, a Tailless Quail Bantam cock (above) and a Tailless Speckled Quail Bantam (below). Mr. Takanura Mitsui, who made these photographs and those on pages 415, 417, 418, and 419, is the author of a monograph on Japanese Bantams.

not for this fact the breed might have become popular in the United Kingdom. It has exercised no particular influence in the development of new breeds (see photograph, page 444).

ITALIAN BREEDS

Domestic fowls have been kept in Italy for at least twenty-five centuries. It is probable that the ancient Romans were among the earliest people to recognize the value of fowl flesh as food for human beings, and certain it is that eggs constituted an important part of their diet. Domestic fowls are mentioned in the works of Cicero, Varro, Columella, and Pliny.

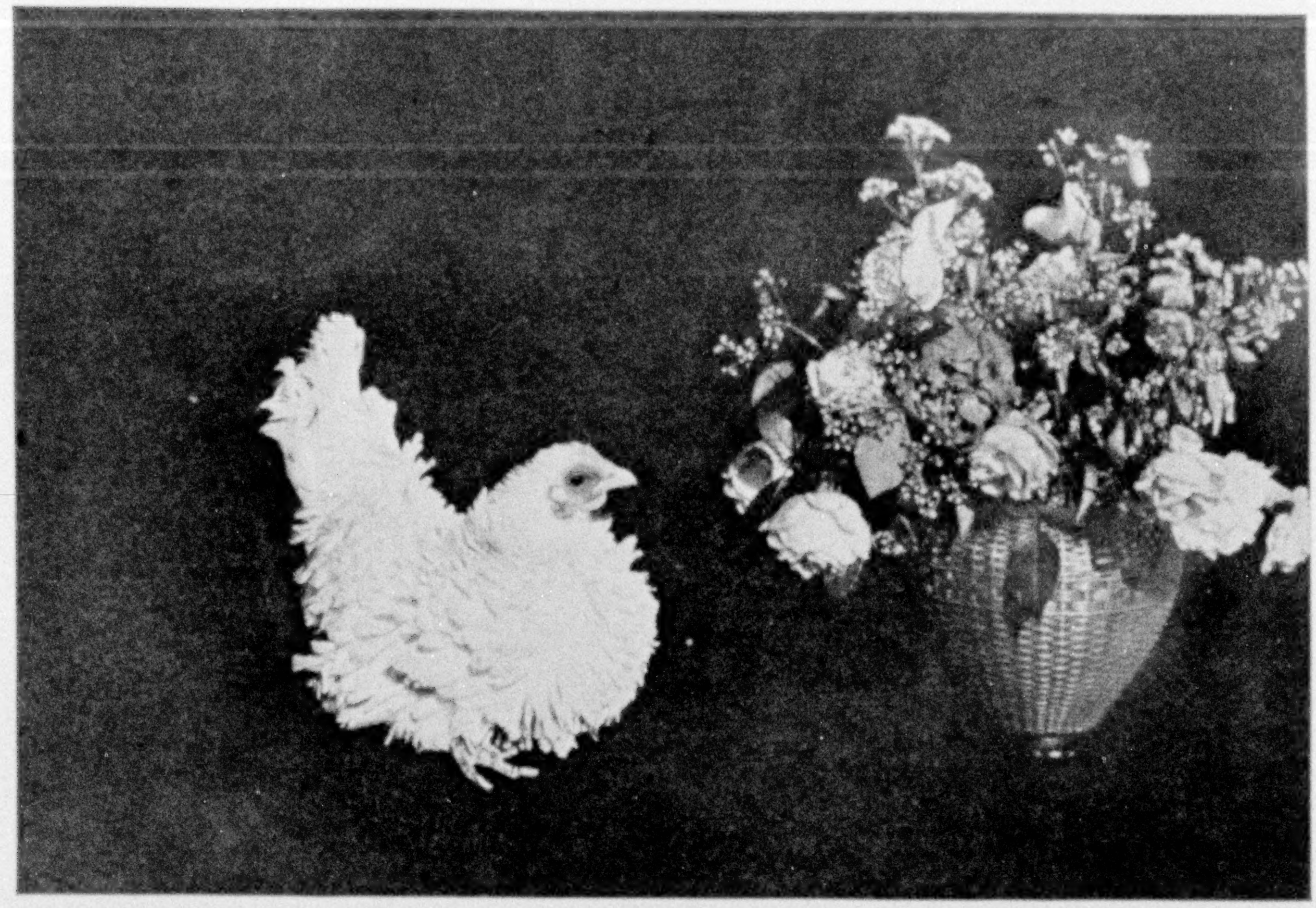
For the most part, the domestic fowls of Italian origin are relatively small, particularly when compared with those of Asiatic origin. Also, among the various breeds indigenous to the northern shores of the Mediterranean there is remarkable uniformity of type, and it is apparent that the Italian breeds have been responsible for fixing the type, to a considerable extent, in many of the breeds developed in adjacent countries.

The Italian breeds include the Ancona, Voldarno, Polverara, and Padovana, but the Leghorn far overshadows all others both in economic importance and in its influence in the development of other breeds.

LEGHORN

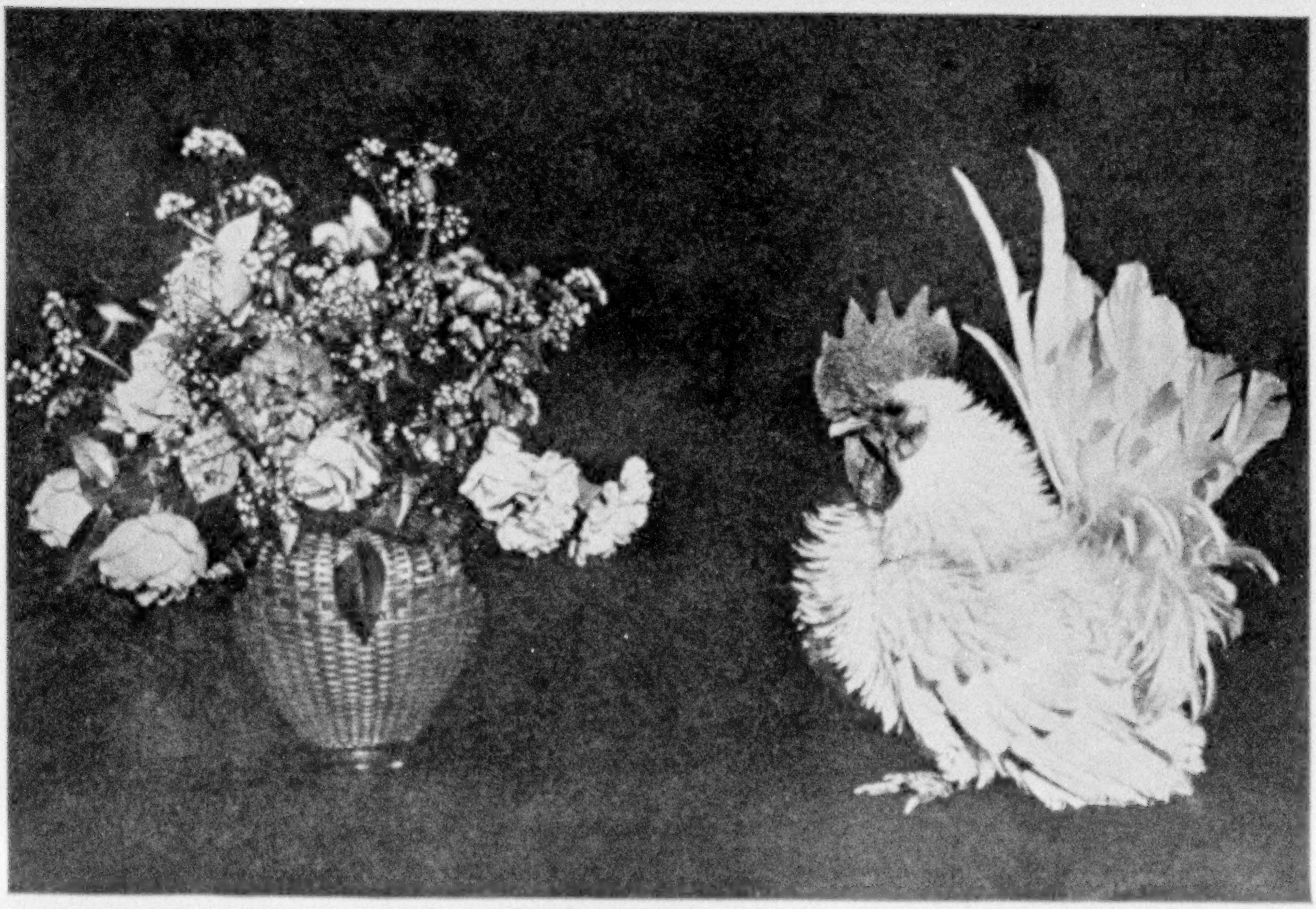
(For Illustration, see Color Plate VII)

In spite of the long-established practice of poultry raising in Italy, there seems to be no



A PEONY BANTAM HEN BRED IN JAPAN

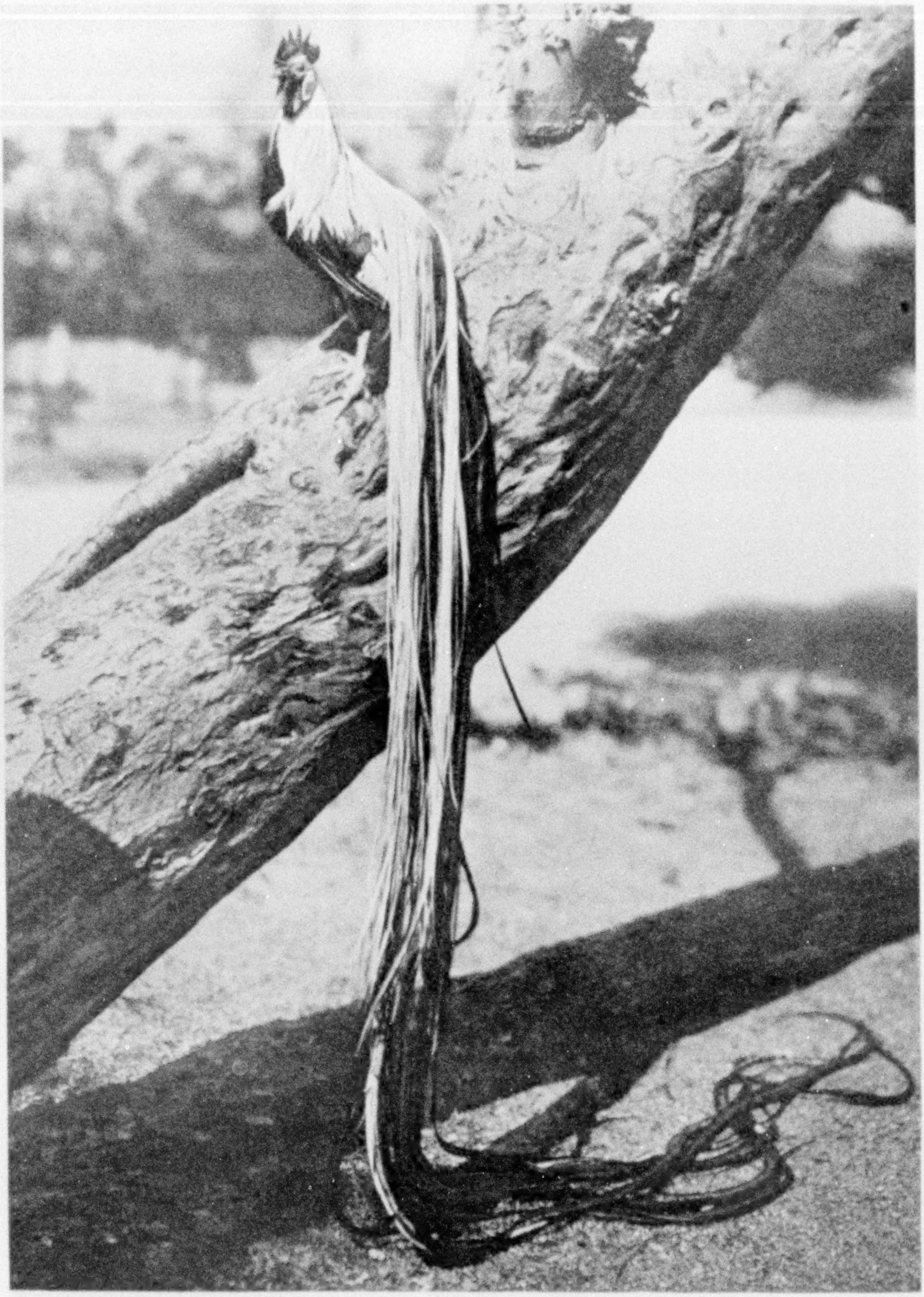
Its feathers are "frizzled" like the petals of a chrysanthemum.



Photographs by Takanura Mitsui

A PEONY BANTAM COCK

Each feather is slightly recurved (see, also, text, pages 402 and 452).



Photograph by Takanura Mitsui

A PATRIARCH OF THE JAPANESE POULTRY WORLD

This silver-gray long-tailed Yokohama, with tail coverts 15 feet long, is approaching life's limit at five years of age.

definite record of the origin of the Leghorn fowl, which was formerly called the Italiana. The earliest importation of the breed into America was about 1835, and from here it was sent to Great Britain.

The greatest improvement in the Leghorn took place subsequent to its importation into America and Great Britain; now it is one of the most popular domestic fowls the world over. In America it is one of the smallest of the popular breeds, the standard weights being approximately one-half those of the Asiatics—cock, 5½; hen, 4; cockerel, 4½, and pullet, 3½ pounds.

The Leghorn has a sweeping curve of neck, back and tail, which is well furnished and well shaped. The breed is known for the graceful blending of its different sections and for its stylish carriage. In the Italian breeds the shanks are all free from feathers.

Both the single-comb and rose-comb varieties are common to this breed, and besides the white variety there are also many colored varieties, including the buff, black, brown, and silver.

Photograph by Takanura Mitsui

A YOKOHAMA COCK, FORMERLY KNOWN AS PHŒNIX

It is the tail coverts and *not* the tail itself which have been lengthened by artificial selection (see, also, pages 415 and 418).

The white, buff, and black varieties have color characteristics common to the White, Buff, and Black Cochins, except that in the case of the Leghorns the ear lobes are white, whereas in all the Asiatic breeds the ear lobes are red.

The Brown Leghorns have a dark-red color pattern as the general plumage coloration. This breed has been improved in color to the greatest extent in America, so that there are now two subvarieties—light and dark brown.

The Dark Brown Leghorn male is a very rich red, with the feathers of the hackle and saddle striped with black. The females of this variety are in general very dark brown.

The Light Brown Leghorn male is much lighter in color than the male of the dark-brown variety; the color pattern is lighter red and usually has less striping in the hackle and saddle. Also, the normally black feathers of the breast and body are more or less mottled with red. The female of the light-brown subvariety has a ground color of light brown with a black tail, dark-brown flight feathers, and fine stippling of dark brown on the back and wings; the breast is salmon color, and the feathers of the hackle are orange yellow, each with a black stripe.

The Silver Leghorn male has a silvery white surface color; the head is silvery white, and the hackle is white, each feather having a medium stripe of black; the cape, main tail feathers, sickles, breast, body, thighs, and fluffs are all black.

The Silver Leghorn female's head and neck are silvery gray, each feather of the latter showing a narrow black stripe. The front of the neck and the breast are light salmon; the back, body, and thighs are silvery white, finely stippled with ash gray; the tail is black except that the upper two feathers are light gray. The female, therefore, is more somber in color than the male, but at the same time has quite a pleasing appearance.

The White Leghorn, pure white in plumage,

is probably the most popular variety in the world. In Italy it has long been the most important fowl, even in its relatively unimproved condition. In England it has been of extreme importance as a producer of eggs, and in America it is kept almost exclusively in the thousands of commercial plants that have been developed in all parts of the country. It is particularly numerous in the commercialized sections, as in Vineland, New Jersey, and Petaluma, California.

The reason for the breed's world-wide popularity probably cannot be stated in definite terms. It is known, however, that a white-feathered bird is relatively easier to breed fairly true to standard color than a parti-colored bird, and this may account in part for its greater popularity than the Brown Leghorn.

The relatively small size of the Leghorn may be in its favor from the standpoint of early maturity and egg production. It has been fairly definitely established, for instance, that White Leghorn pullets commence laying approximately 30 days before pullets of such breeds as the Plymouth Rocks, Rhode Island Reds, and Wyandottes, and probably about 60 days before pullets of the Brahma and Langshan breeds.

The White Leghorn is one of our best egg producers, and it is probably on a par with all other breeds in respect to the costs of reproducing the flocks from year to year. On the other hand it does not take front rank in table-poultry quality, even though the cockerels, sold at from 8 to 12 weeks of age, make very satisfactory broilers.

In spite of its inferiority as a roasting bird, the Leghorn in America has gone ahead steadily and apparently is becoming relatively more numerous every year, for farmers and commercial poultry producers have found that the major portion of the revenue from a flock is obtained from eggs.

ANCONA

(For Illustration, see Color Plate VI)

The Ancona is sometimes referred to as the "Mottled Leghorn," and apparently originated in Italy in the vicinity of Ancona, an Italian seaport on the Adriatic.

Anconas were imported into England about the middle of the last century, and thence found their way to America. They are of the same general type as the Leghorn, and have the same distinctive color characteristic except that here the plumage is black, with from one-third to one-fifth of the feathers tipped with white, giving the entire plumage a mottled appearance. In America, they have gained some popularity, but in other parts of the world they have not assumed a place of great importance.

SPANISH BREEDS

The Spanish breeds of chickens are, for the most part, of the same general type as the Italian, and have white ear lobes, which is to be expected, in view of the proximity of the two countries.

The Spanish breeds are larger than the Italian, but have not exercised as much influence in modern poultry culture as have the Leghorns, for instance. This seems strange, in view of the fact that Spain was at one time the foremost power in the world, mistress of the seas, possessor of numerous colonies, and her influence, through intercommunication with other countries, was greater than that of any other nation.

The six Spanish breeds are the Castilian, Black Spanish, Minorca, Andalusian, Barbezieux, and the Prat. They are noted for their remarkable uniformity of type, and some of them are quite closely related. The Castilian, Minorca, and Andalusian alone warrant detailed consideration here.

CASTILIAN

The Castilian breed is often referred to as the "Moorish" fowl, since it appears to have been first introduced into Spain during the Moorish occupation. Other than this, there appears to be little direct evidence concerning its origin. It is widely distributed throughout Old Castile and in other parts of Spain. The Castilian is regarded by many as the progenitor of the Minorca, which it strongly resembles. The most popular variety is the Black, although there are a few White Castilians in different parts of Spain.

The Black Spanish is another breed closely related to both the Castilian and the Minorca, and is of the same general type and color as the Black Castilian and the Black Minorca. It is a very old breed and has a white face, the extent of the whiteness having been developed materially during recent years. This peculiar characteristic has been seized upon by fanciers and developed to such an extent that whatever economic qualities the Black Spanish ever possessed have been practically lost (see page 445).

White-Faced Spanish fowls have been known for centuries in both England and Ireland, which would suggest that it was one of the earliest breeds developed in Spain.

MINORCA

(For Illustration, see Color Plate II)

The most popular of all the Spanish breeds is the Minorca, especially the black variety. It probably descended directly from the Castilian breed, introduced into the Peninsula by the Moors. The more improved Minorca came from the Balearic Islands, off the east coast of Spain.

In America and England it has gained considerable popularity, but does not rank with the White Leghorn. It is much larger than the latter, the standard weights being, for the black variety: Cock, 9; hen, 7½; cockerel, 7½; and pullet, 6½ pounds, and it lays, on the average, a larger egg than the Leghorn.

The Minorca probably lays the whitest-shelled egg of all chickens, but the black feathers in the black variety and the relatively large comb are two factors that apparently prevent its becoming as popular commercially as the White Leghorn. There are single-comb buff, single-comb and rose-comb white, single and rose-comb black varieties, but the single-comb black variety is the only one that has gained popularity either in America or England.

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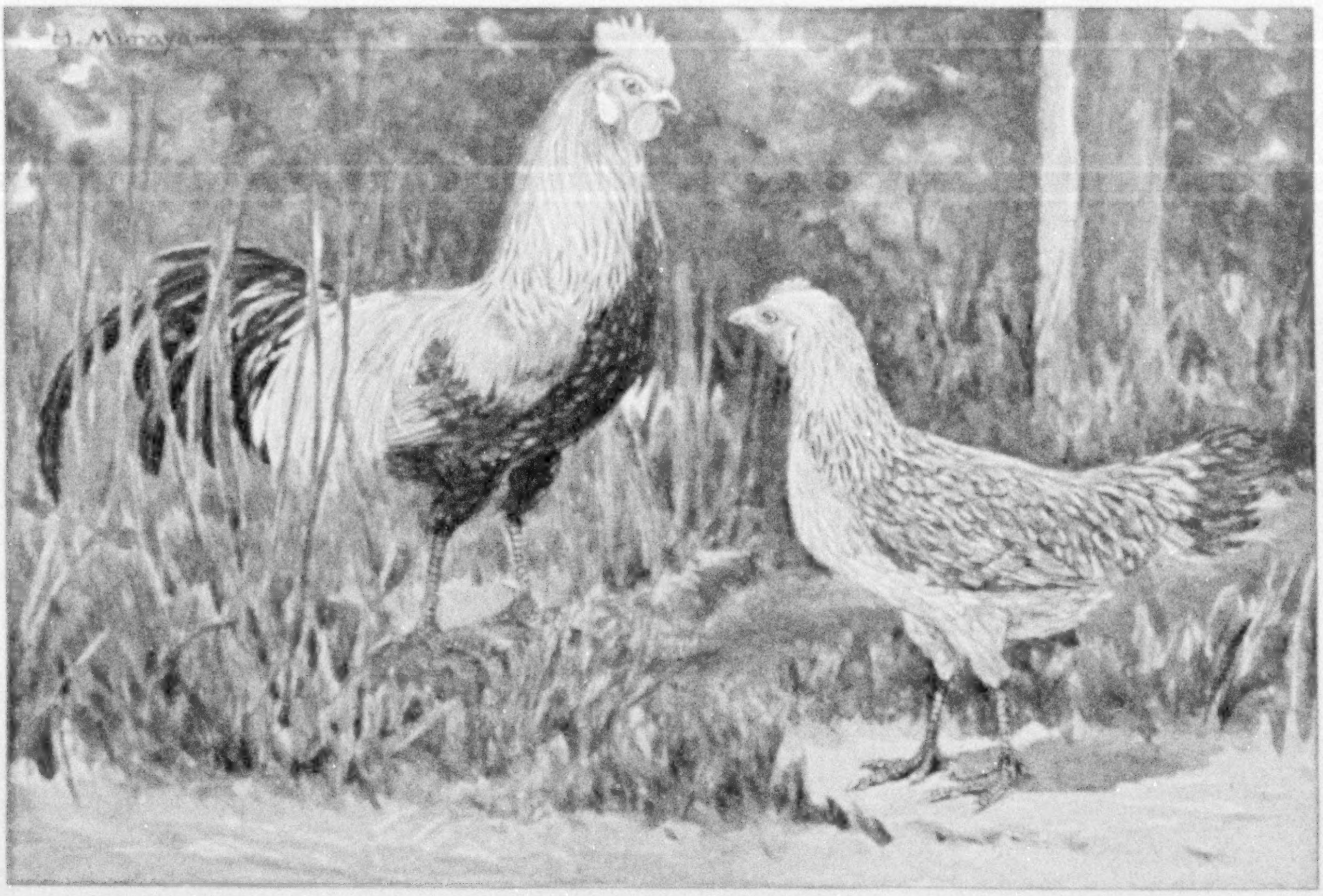
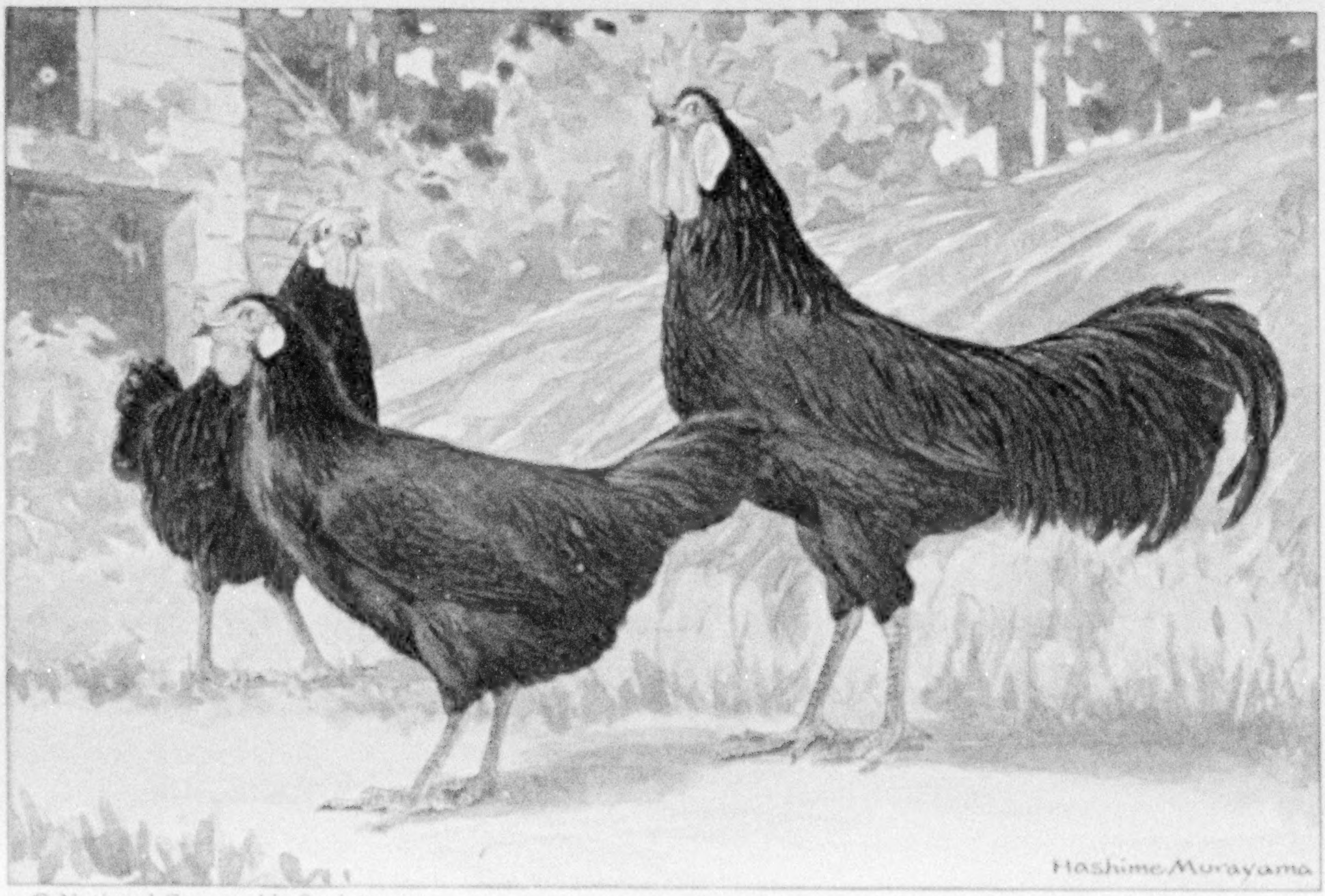
YOKOHAMAS, DEVELOPED IN JAPAN

The cock of this beautiful and spectacular breed of domestic fowls has tail coverts of remarkable length, the longest on record being more than twenty feet. The Yokohama has been bred in Japan for hundreds of years (see, also, text, page 452).



THE GALLUS BANKIVA, OR RED JUNGLE FOWL

Widely distributed throughout eastern India, Burma, Siam and Sumatra, this species is believed by many investigators to be the parent bird of the modern breeds of domestic fowls (see text, pages 382 and 383).



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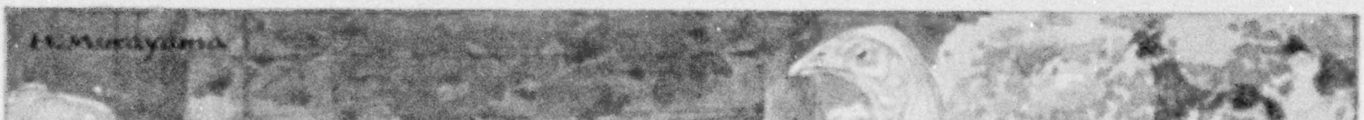
BLACK MINORCAS (SEE TEXT, PAGE 420)

With the exception of the White Leghorn (see Color Plate VII), the Minorcas are the most popular of all the Mediterranean breeds of fowls. They lay the whitest-shelled eggs of the poultry world. There are Buff and White varieties, too, but the Black Minorca alone has won favor in America.

DOMINIQUES, ONCE FAVORITES BUT NOW DISAPPEARING (SEE TEXT, PAGE 444)

It has been more than 175 years since the first purely barred chickens became widely known in our Eastern States. They received the name "Dominique" about the time of America's first poultry show, in 1849. (See studies in barring, page 388).



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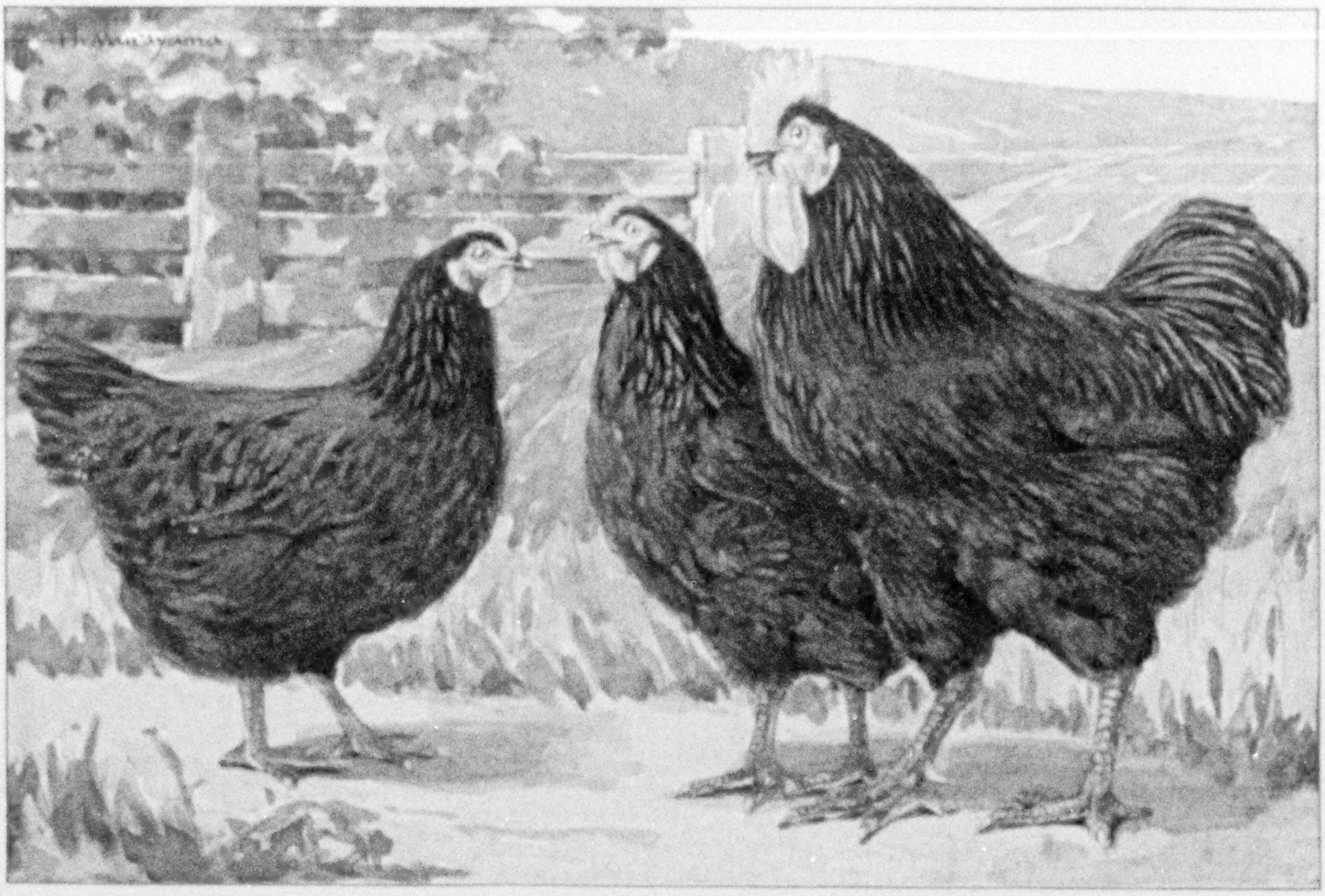
RED PYLE GAMES (SEE TEXT, PAGE 440)

One of the most extensively bred of the eight varieties of Exhibition Game Fowls recognized as standard in the United States. The modern "egg machine," producing from 150 to 350 eggs a year (see Color Plate VII), and the giant flesh fowls (Plates IV and XVI) both owe much of their development to man's love for the gamecock.



JERSEY BLACK GIANTS, OUR LARGEST CHICKENS (SEE TEXT, PAGE 450)

These superb roasting birds are even heavier than the great Light Brahmas, the cocks weighing 13, hens 10, cockerels 11, and pullets 8 pounds.

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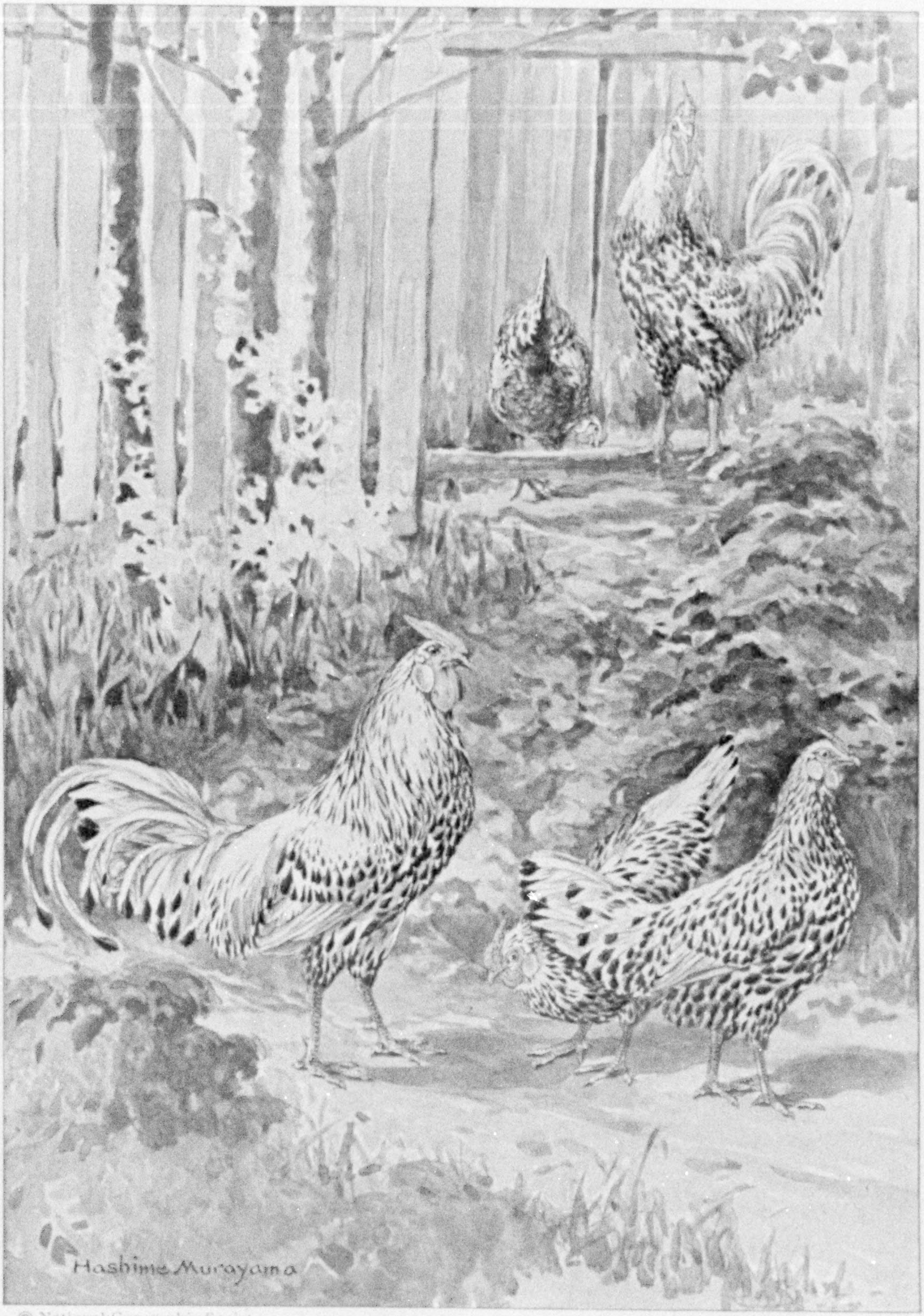
LIGHT BRAHMAS, FROM ASIA (SEE TEXT, PAGE 413)

There are two varieties of Brahmas, the Light and Dark. The former is the larger bird, the standard weights being: cock 12, hen 9½, cockerel 10 and pullet 8 pounds. The Dark Brahmas average a pound less. Birds of this breed were first brought to this country eighty years ago, and have played an important part in the development of American fowls.



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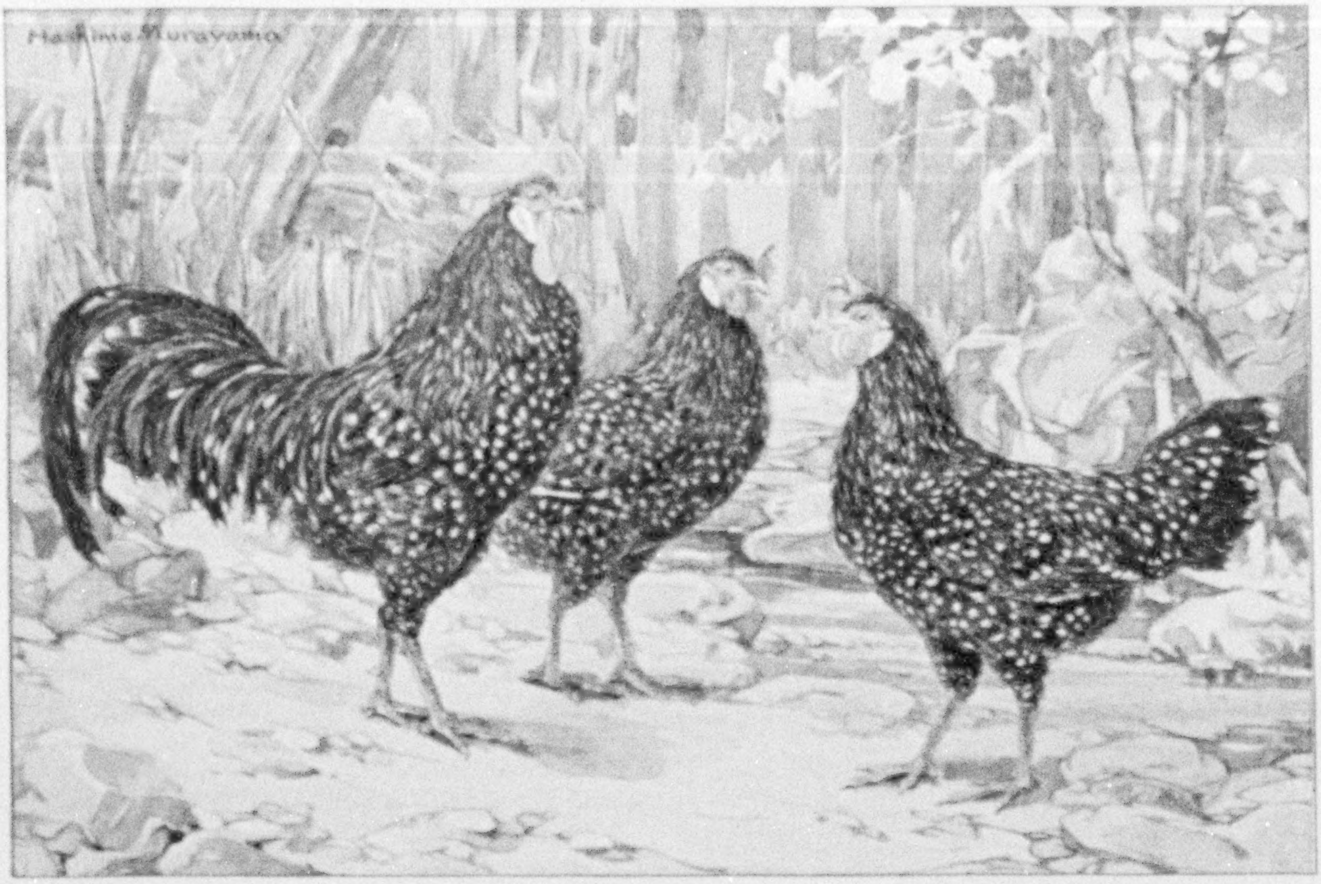
SILVER SPANGLED HAMBURGS (SEE TEXT, PAGE 438)

A beautiful fowl which has been known in America for a hundred years, and is supposed to have originated from infusions of blood from birds of Italy with others of western Europe. In addition to the Silver Spangled variety shown above, five other Hamburgs are recognized in America—the Golden Spangled, Golden Penciled, Silver Penciled, White, and Black (see page 389).



SINGLE COMB ANCONAS (SEE TEXT, PAGE 420)

Outside of their native Italy, the Anconas, or Mottled Leghorns as they are sometimes called, are scarcely known, save in America, where they arrived by way of England (see page 391). In general they have characteristics similar to their more famous cousins and compatriots, the Leghorns (see opposite page).

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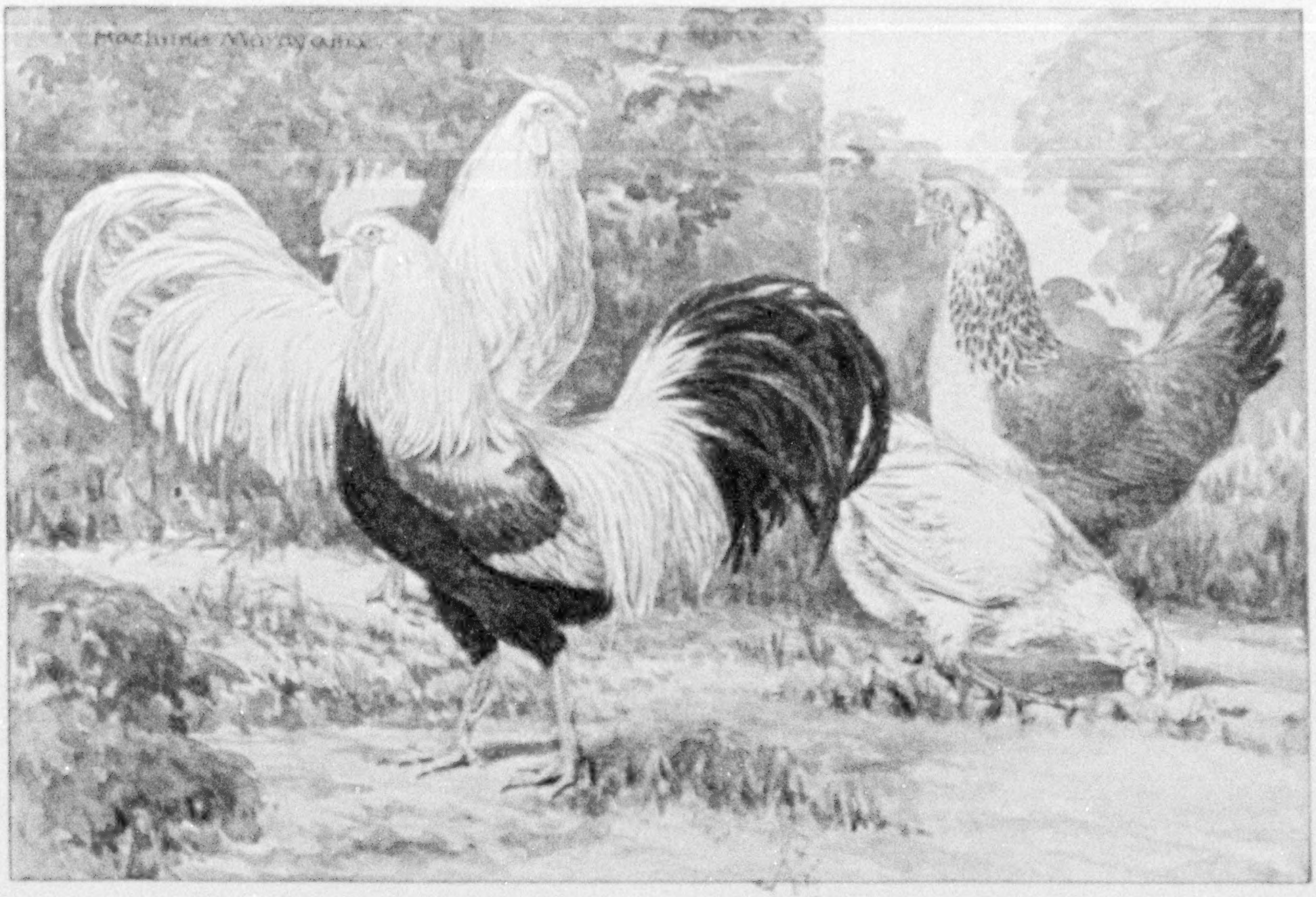
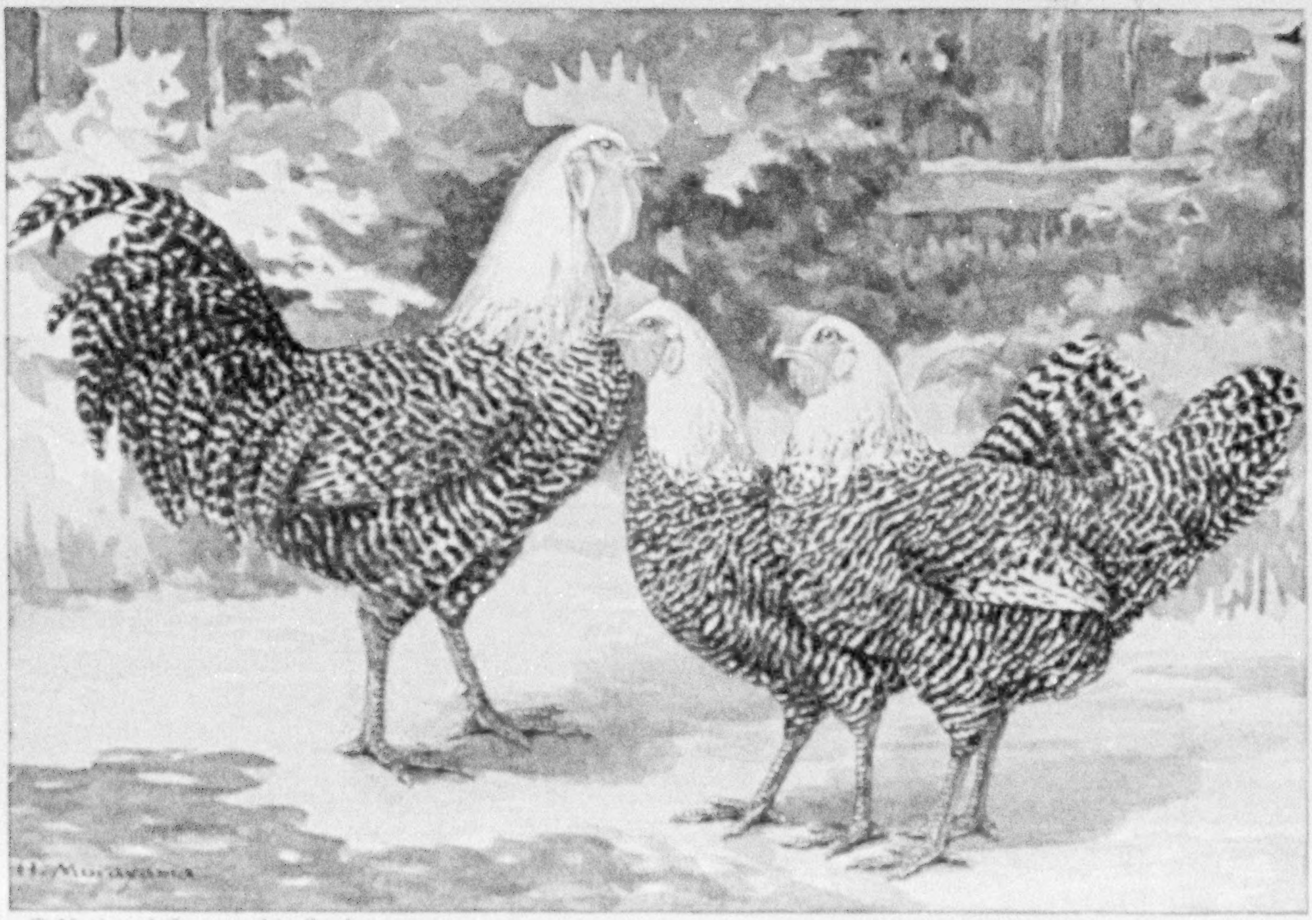
BLUE ANDALUSIANS (SEE TEXT, PAGE 437)

While of comparatively little economic importance, this breed commands interest on account of its lovely slate-blue plumage laced with a darker hue. In its veins flows the blood of the Black Spanish, an old breed having a white face (see page 445). The Andalusian was originally known as the Blue Minorca. For explanation of this peculiar blue color see page 387.



WHITE AND BROWN LEGHORNS (SEE TEXT, PAGES 416-420)

Known as "the greatest egg-laying machine of the poultry world," the White Leghorn is probably the most numerous breed of domestic fowl in America. In addition to the White and the Brown, there are Buff, Black and Silver Leghorns. The standard weights are: cock, 5½, hen 4, cockerel 4½, and pullet 3½ pounds.



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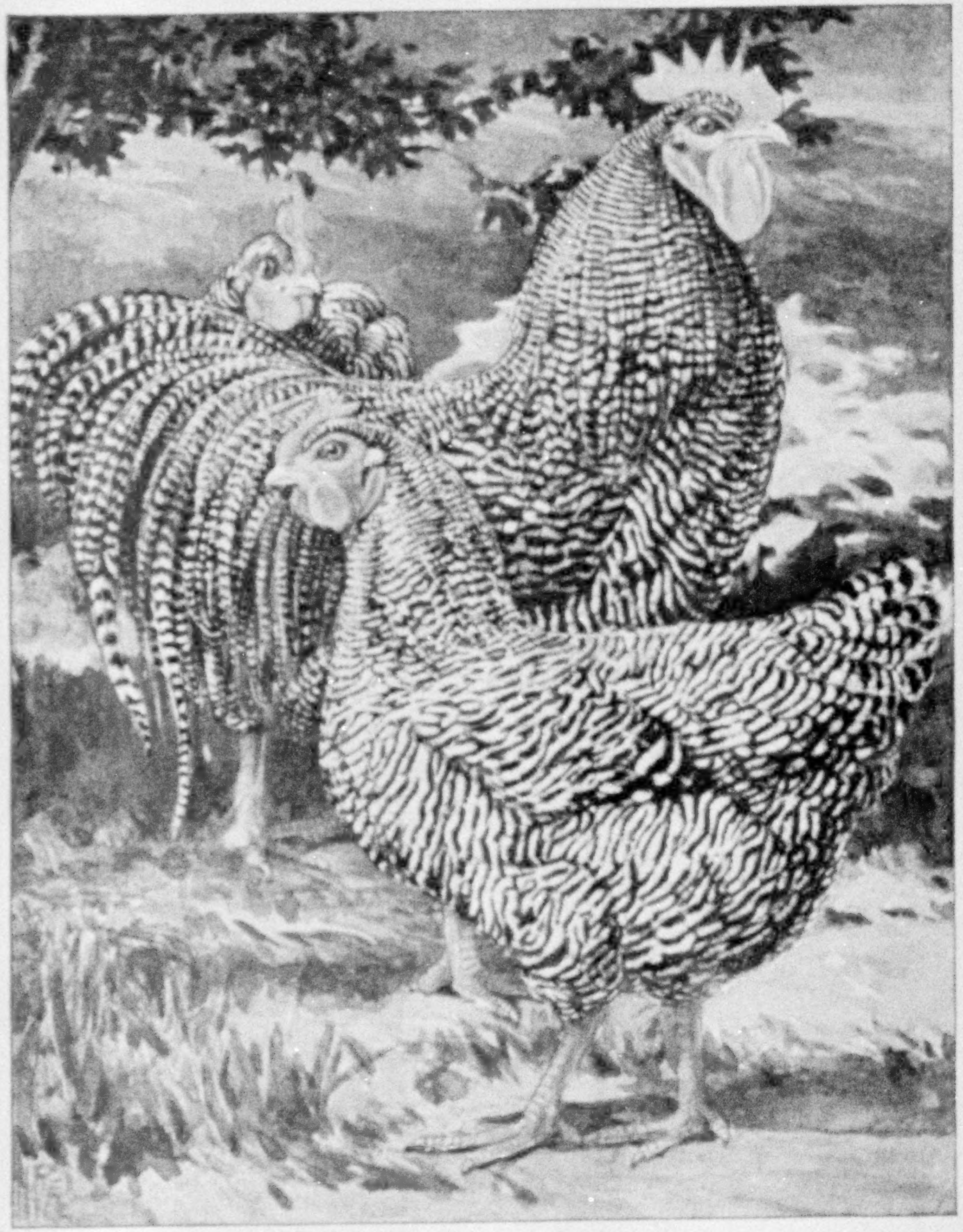
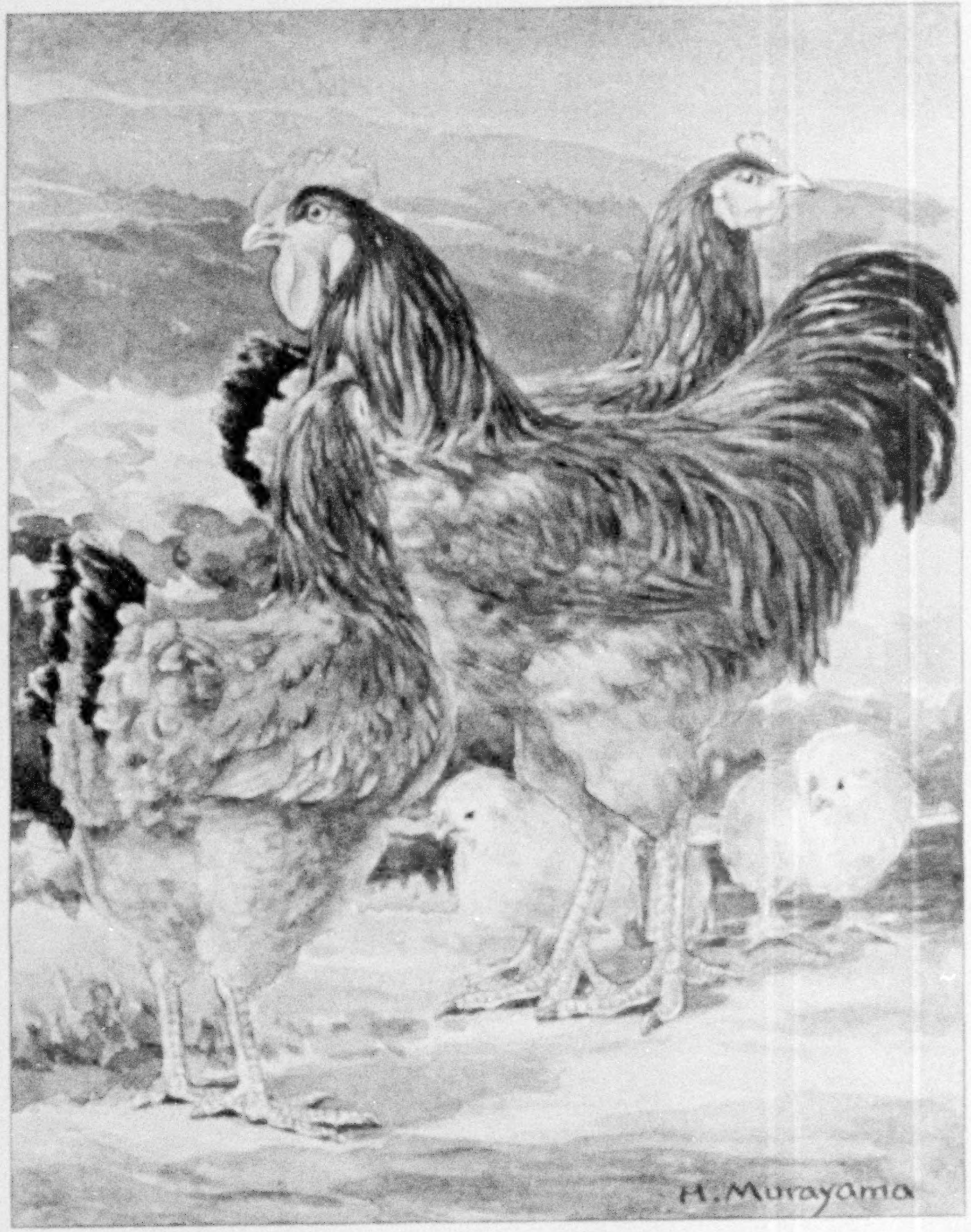
SILVER CAMPINES (SEE TEXT, PAGE 437)

The Campines are among the "first families" of western Europe, and were flourishing in Belgium nearly 300 years before the discovery of America. Besides the variety shown above there is a Golden Campine, of greenish black plumage with wide bars of golden bay. The Campines, like the Leghorns, are bred chiefly for egg production.





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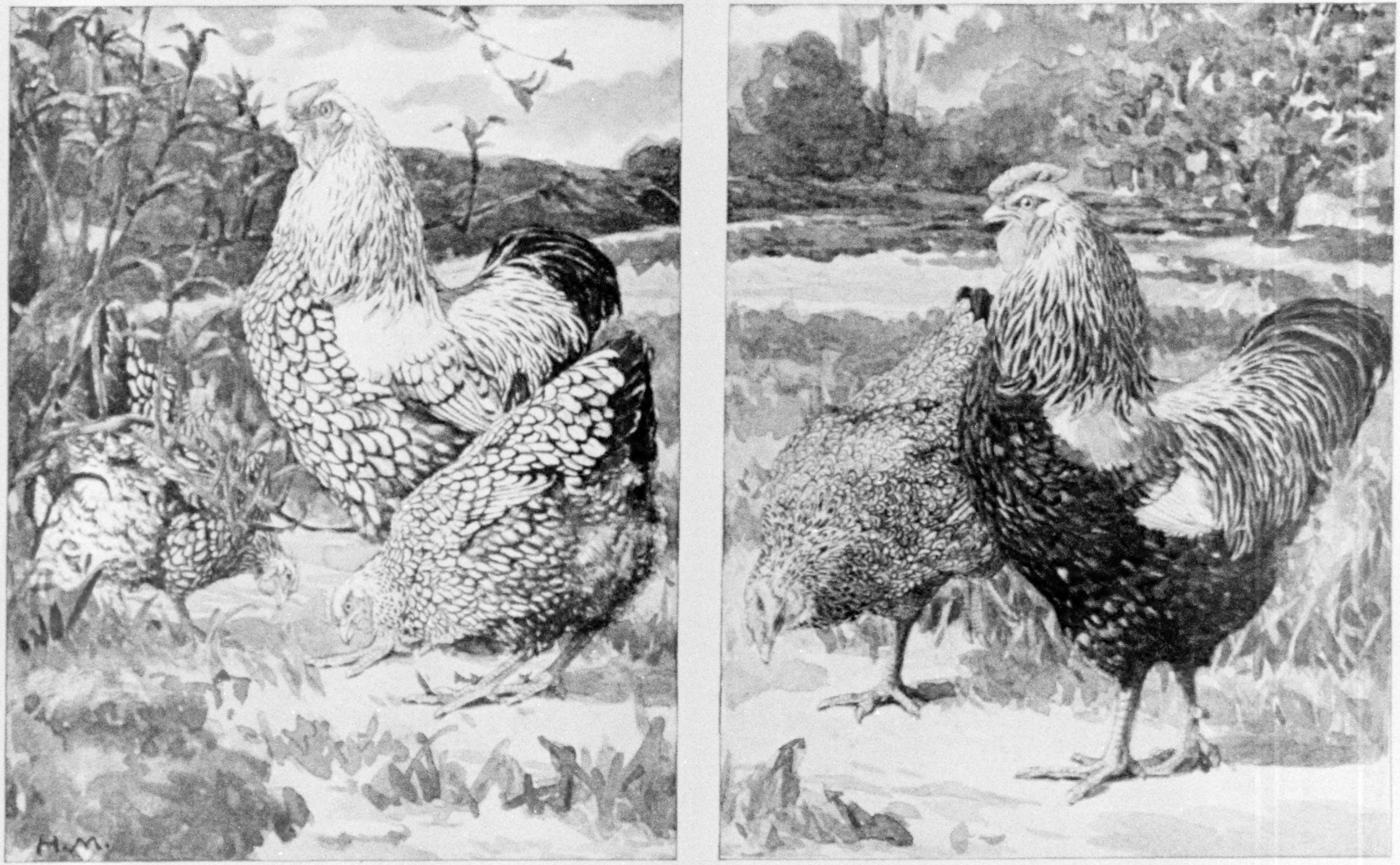
TWO OF AMERICA'S MOST FAMOUS BREEDS: BARRED PLYMOUTH ROCKS (LEFT) AND RHODE ISLAND REDS (RIGHT) (SEE TEXT, PAGES 445 AND 450)

The disappearing Dominique (see Color Plate III) was one of the forbears of the Plymouth Rock, which enjoys increasing popularity in this country. In addition to the Barred variety, there are Buff, White, Partridge, Silver Penciled, and Columbian Plymouth Rocks. The standard weights are: cock 9½, hen 7½, cockerel 8, and pullet 6 pounds.

The superb Rhode Island Red is an excellent table fowl as well as a splendid layer. There are two subvarieties of the breed, and the only difference is in the form of the comb—single and rose. The standard weights are: cock 8½, hen 6½, cockerel 7½, and pullet 5½ pounds.



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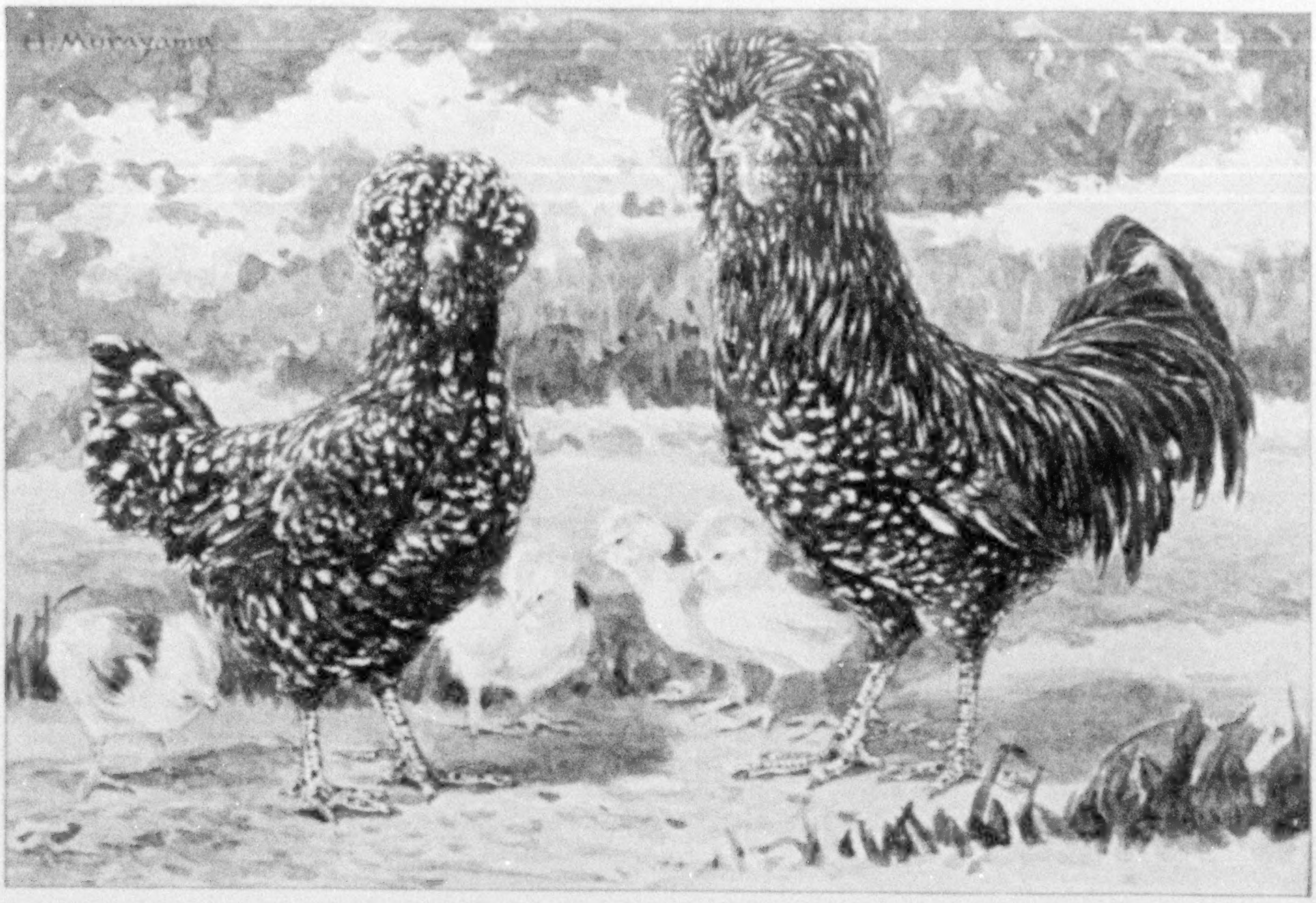
SILVER LACED WYANDOTTES (LEFT) AND PARTRIDGE WYANDOTTES (RIGHT), DEVELOPED IN AMERICA (SEE TEXT, PAGES 448-449)

Both fancy breeders and utility poultrymen are partial to the Wyandottes, for they possess many fine points. There are numerous color combinations in addition to the two varieties depicted by the artist—White, Golden Laced, Buff, Silver Penciled, Columbian, and Black. The plumage of the Partridge Wyandotte is triple penciled. The standard weights are the same as for the Rhode Island Reds (see preceding page). For studies of these handsome feather patterns see pages 388-389.



THE CRESTED AND BEARDED HOUDAN (SEE TEXT, PAGE 437)

This striking five-toed French fowl is not a mere freak of the poultry world but is a highly valued table bird and is one of the few breeds of France that has been successfully introduced abroad. Two varieties are recognized in America—the Mottled and the White.

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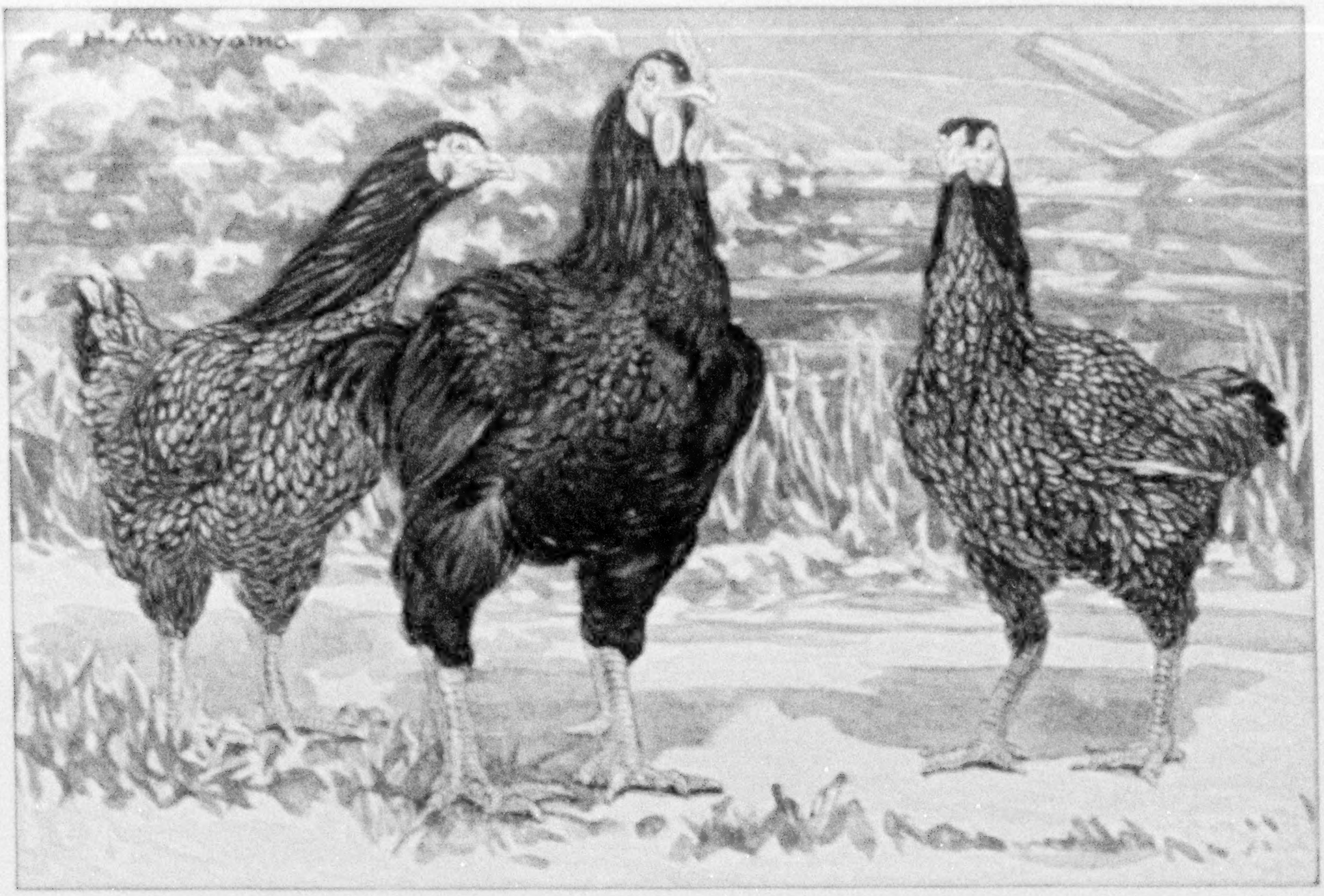
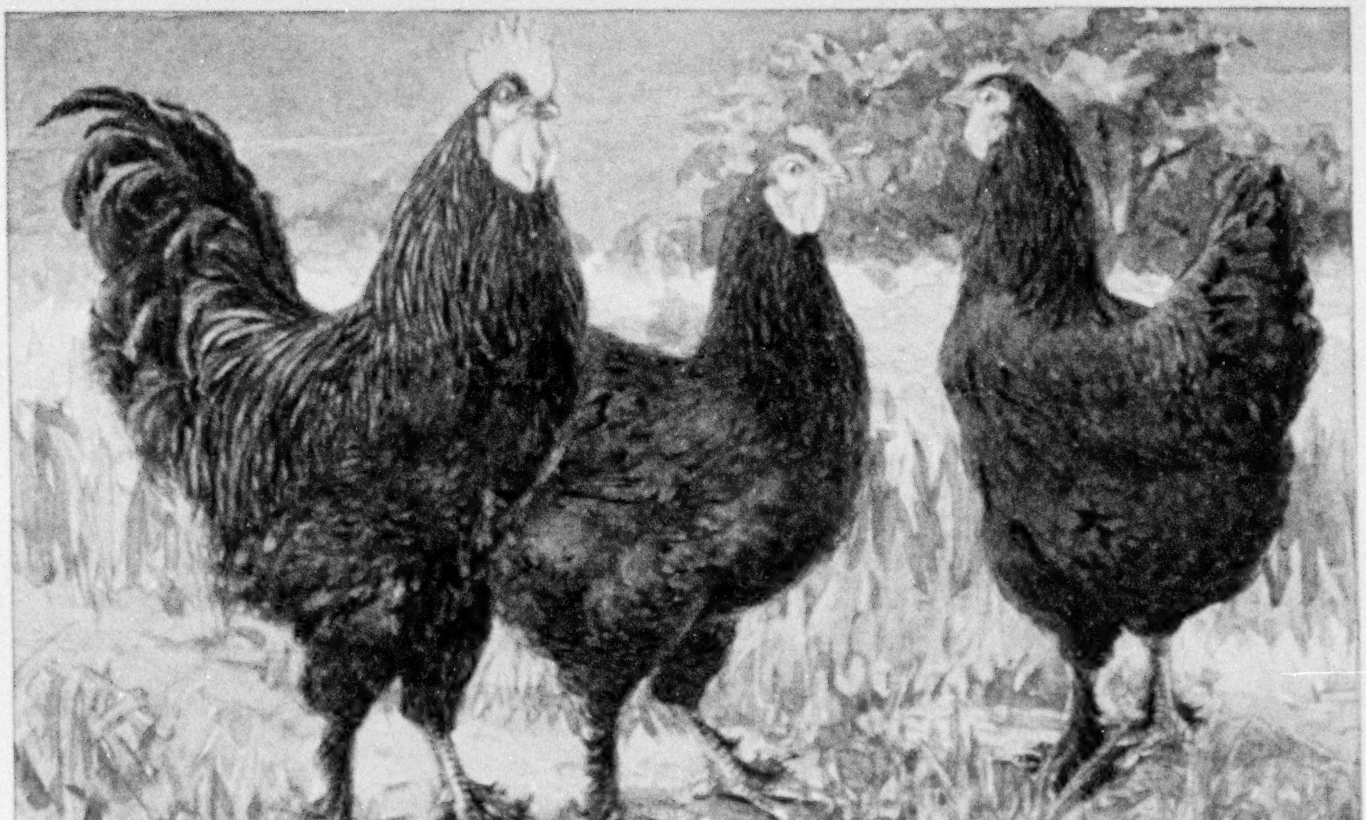
ENGLAND'S POPULAR SPECKLED SUSSEX (SEE TEXT, PAGE 441)

The first Sussex were brought to America at the beginning of this century. Of the three varieties, Light, Red, and Speckled, only the last two are recognized as standard breeds in this country.



DARK CORNISH (SEE TEXT, PAGE 440)

A strong strain of Game Fowl runs in the veins of the Dark Cornish, which has won favor as a table bird in America because of its yellow skin. There are three varieties—Dark, White, and White-laced Red. The feathers of the Dark Cornish have double penciling (see page 388).



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BLACK LANGSHANS (SEE TEXT, PAGE 414)

Like the Brahmas and the Cochin (see Color Plates IV and XVI), the Black Langshan is a massive bird with feathered shanks. It is a native of China, from the Langshan district.

FRIZZLES (SEE TEXT, PAGE 452)

These fussy-feathered fowls are natives of the Far East. Their plumage peculiarity is of special interest to students of heredity (see page 402).

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BEARDED SILVER POLISH (SEE TEXT, PAGE 438)

The breed belies its name, for it originated, not in Poland, but in Italy. Its chief progenitor was the Polverara, indigenous to the province of Padua. In addition to the Bearded Silver shown above there are Golden, White, Black, and Buff-laced varieties. Note the muff on either side of the beard, found also in the Faverolle and in the Sultan.

WHITE SILKIES (SEE TEXT, PAGE 452)

The only Negro of the fowl world. Beneath the soft white feathers is a black skin. The origin of the breed is cloaked in mystery.

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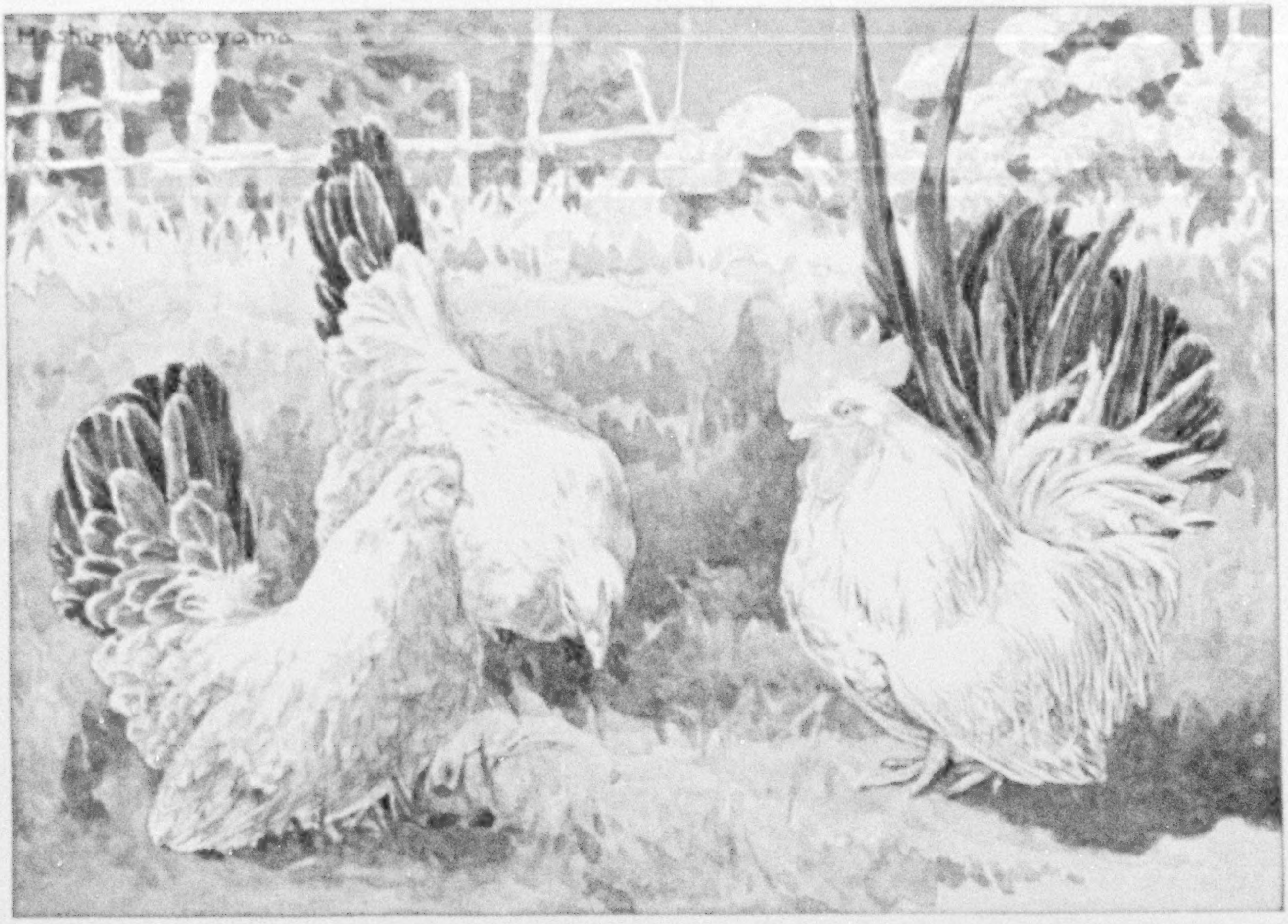
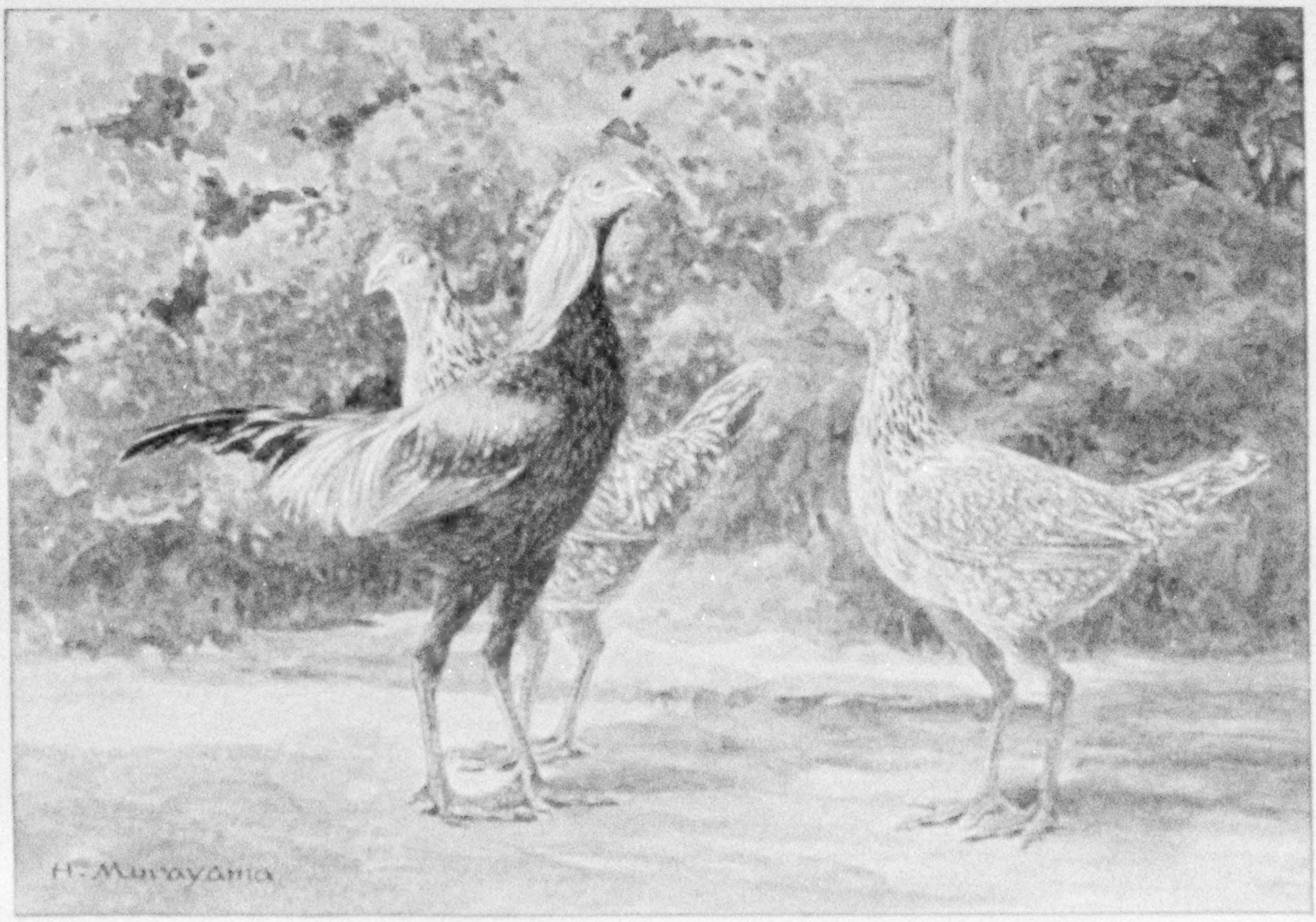
ARAUCANAS, NATIVES OF SOUTH AMERICA (SEE TEXT, PAGE 452)

A strange fowl from Chile which was discovered only thirteen years ago. It is the only domestic bird that lays a blue egg. Among other distinguishing characteristics, it is rumpless and wears tufts of feathers on its neck. The plumage pattern of this unique breed has not been definitely fixed.



BLACK TAILED WHITE JAPANESE BANTAMS (SEE TEXT, PAGE 451)

In addition to its diminutive size, this Bantam is distinguished for its large comb. The standard weights are: cock 26, hen 22, cockerel 22 and pullet 20 ounces.



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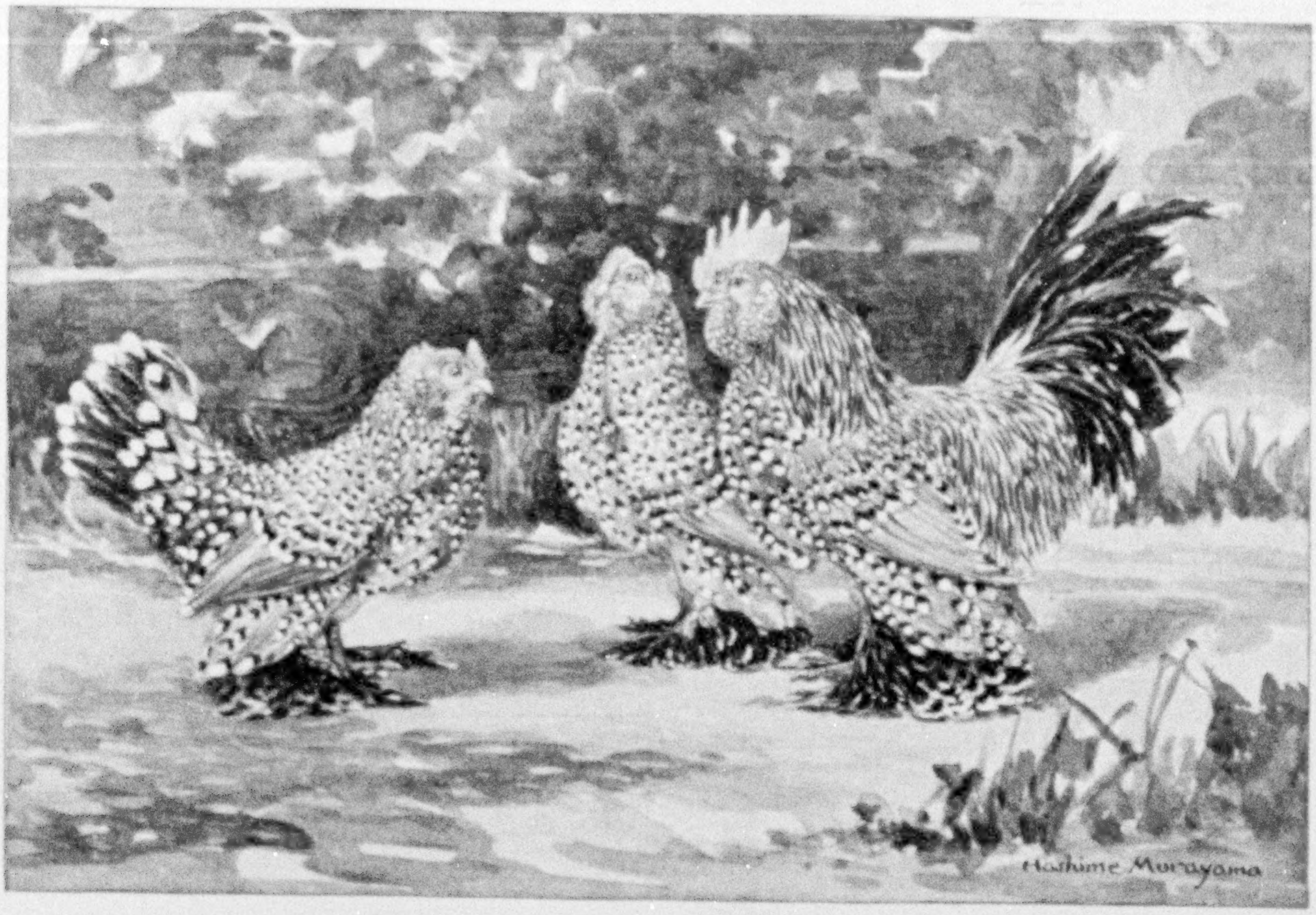
BLACK BREASTED RED GAME BANTAMS (SEE TEXT, PAGE 451)

The birds are miniature counterparts of a large Malay game breed. The standard weights are: cock 22, hen 20, cockerel 20 and pullet 18 ounces.



MILLE FLEUR BOOTED BANTAMS (SEE TEXT, PAGE 451)

A diminutive French fowl that gets its name from the "thousand flowers" effect of its attractive plumage. The standard weights are the same as the Black Tailed Japanese Bantams (see preceding page).

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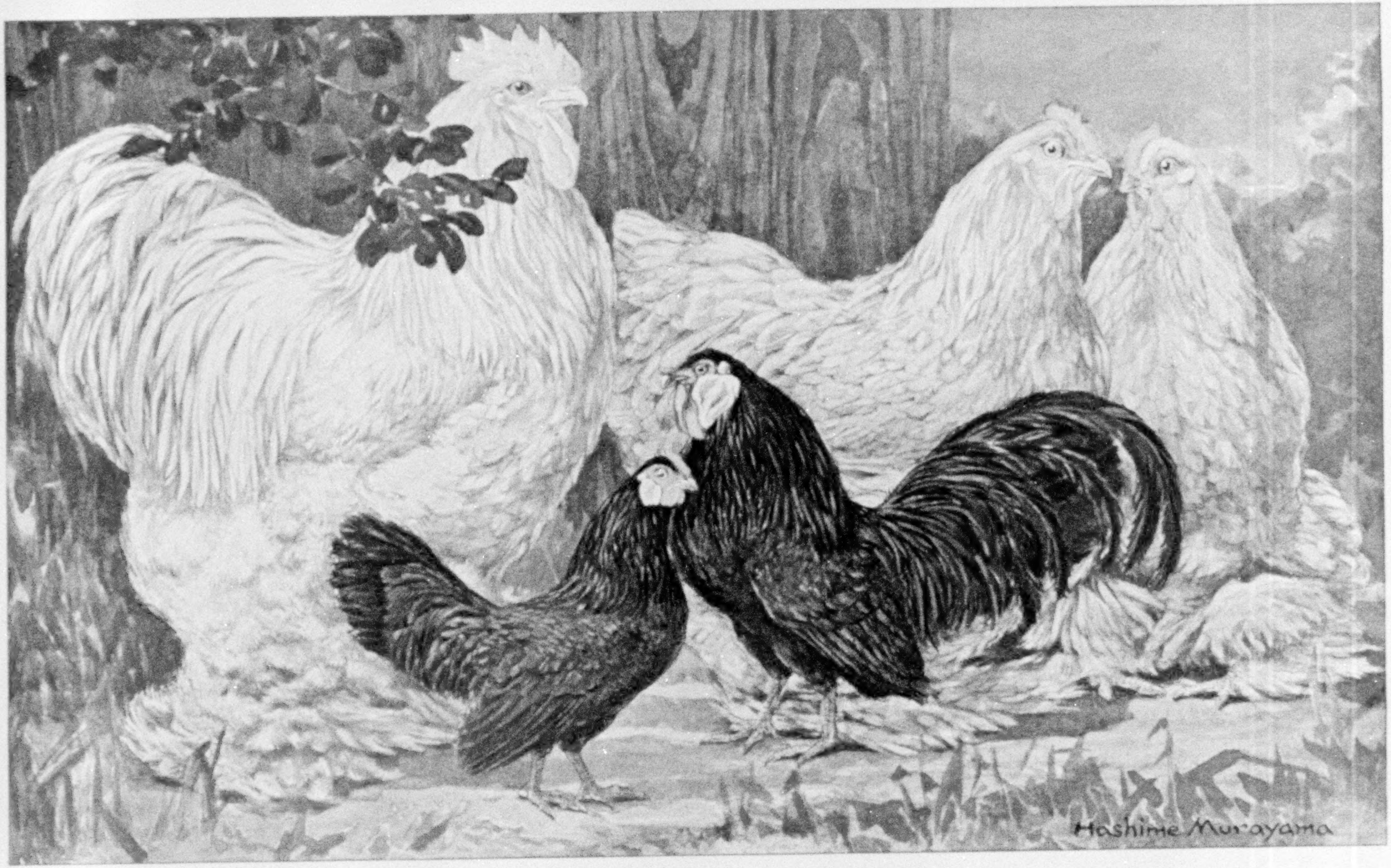
SILVER SEBRIGHT BANTAM

The Sebright also occurs as a Golden variety, in which the white of the feather is replaced by golden bay. The weights are the same as the Black Tailed Japanese Bantams.



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BUFF COCHINS (IN THE BACKGROUND) AND ROSE COMB BLACK BANTAMS (SEE TEXT, PAGES 413 AND 451)

The Cochins have probably exercised greater influence upon the poultry of European countries and of America than any other Asiatic breed. The standard weights are: cock 11, hen 8½, cockerel 9, and pullet 7 pounds. In addition to the Buff, shown above, there are three other varieties of Cochin —White, Black, and Partridge. The Rose Comb Black Bantam is a diminutive Hamburg (see Color Plate V), whose standard weights are: cock 26, hen 22, cockerel 22, and pullet 20 ounces.

ANDALUSIAN

(For Illustration, see Color Plate VI)

The Andalusian was first known as the Blue Minorca. It has been bred to a considerable extent in Spain, although it has had slight economic significance.

The breed is kept to some extent in both America and England, but largely as a fancy fowl. The color of the plumage is a slate blue, laced with darker blue. The breast and body of the male are of the same color as those of the female, while his hackle, back, saddle, and tail are bluish black, giving him a more striking appearance than his mate.

One interesting fact in the breeding of the Blue Andalusians is that the color might be called a hybrid—that is, when the blue male is mated to a blue female only half the progeny are blue, one-quarter are black, and one-quarter are white.

To produce progeny which are all blue, it is necessary to cross black Andalusians with white ones. This situation is interesting from the biological standpoint, largely because, as a result of a study of various matings, it has been discovered that the blue coloration is due to the particular shape and the manner in which the black pigment granules are laid down in the feathers (see, also, pages 387 and 401).

FRENCH BREEDS

In a country where "Le Coq" has been adopted as the national emblem, it is to be expected that the domestic fowl has played a significant part in the life of the nation, and so it is observed that France has developed a greater number of breeds than any other country.

On his relatively limited acreage the French peasant found poultry to be a steady source of income, and it was quite natural, therefore, that in the development of new breeds economic qualities were given first consideration.

Though the majority of French breeds represent fairly well-defined types and are suited to French market requirements, few of them have found favor in other countries. Among the breeds firmly established are the Bresse, La Flèche, Du Mans, Crève-cœur, Houdan, and Faverolle, but the only ones warranting special discussion are the last two.

HOUDAN

(For Illustration, see Color Plate X)

This five-toed breed, with a well-developed crest and beard, has been raised for many years in the Seine-et-Oise Department, where it originated. Its egg-and-meat-producing qualities have given it a prominent place in the poultry industry of France, where it is very popular. It was imported into England about 1850, and for a number of years was popular there also. It was later imported into America and became fairly widespread, although it is not now numerous. Two varieties, the Mottled and the White, are recognized in America.

The Faverolles (see page 398) were originated from crosses involving the Crève-cœur (see page 441), Houdan, Light Brahma, and possibly one or two other breeds. Because of their good size and fleshing properties they became quite popular. Characteristics of the Faverolles include a beard, muffs, and feathered shanks.

There are three varieties in France—the Salmon, the Light, and the Black. It has no widespread popularity in America, although the Salmon is recognized as a standard variety. In recent years a white variety has been developed and it presents quite a striking appearance.

Other French breeds include the Mantes, Caussade, French Cuckoo, Bourbourg, Estaires, and Hergnies, but they all have only local significance and are not met with outside of France.

BELGIAN BREEDS

The thrift of Belgian peasants is proverbial, and it is not surprising to find, therefore, that their breeds of poultry were developed primarily for economic purposes. But of the ten breeds that originated in Belgium, only one, the Campine, has gained any popularity in other countries.

CAMPINE

(For Illustration, see Color Plate VII)

Dating back by tradition as far as 1206 and by established fact for several centuries, the Campine is one of the oldest breeds of western Europe, where for many years it was fairly widespread, but more recently it has been bred chiefly in Belgium for egg production. Two varieties are recognized in America—the Silver and Golden.

The plumage of the Silver Campine is greenish black, with wide white bars, while the plumage of the Golden Campine is greenish black, with wide bars of golden bay.

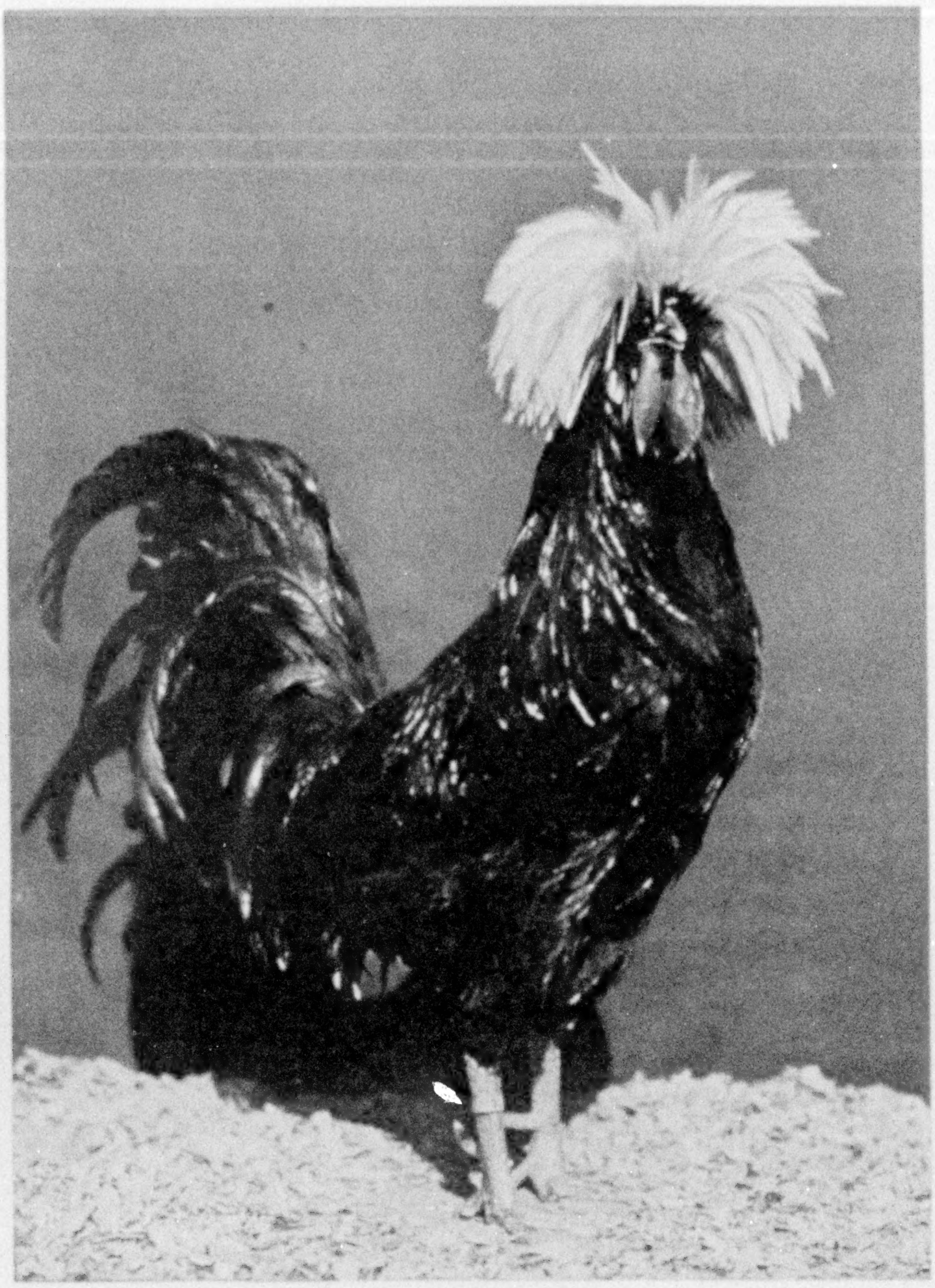
Of marked interest in this breed is the fact that the males are "hen-feathered"—that is, the secondary sexual feathers, the hackle, saddle, and tail feathers are of the same shape and approximately the same length as in the females. The exact cause of this condition has been a subject of much investigation by biologists and is not yet settled.

Of the other Belgian breeds, the Braekel and the Malines were offshoots of the Campine, and the Ardeune, Bruges, Flemish Cuckoo, Herve, Huttegem, Brabant, and Antwerp Braham are rarely found outside their respective local districts in Belgium.

OTHER EUROPEAN BREEDS

The Dutch have not been nearly so disposed to develop new and economically important breeds of fowl as the French and Belgians. The five breeds originating in Holland—the Crested Dutch, Friesland, Breda, Owl-bearded Dutch, and Drente—are not bred anywhere except, to a limited extent, in that country.

The comparatively few breeds of fowls that have originated in Germany, including the Lakenfelder, German Creeper, Ramelsloh, Schlotterkamm (flabby comb), Bergische Cromer, the



Photograph courtesy U. S. Department of Agriculture

WHITE-CRESTED BLACK POLISH MALE

This variety of the Polish fowl is glossy black in body, with a large white crest. Interest in the breed as a whole has diminished since 1870, due to the rise of the Leghorn and to the fact that the crest is an incumbrance to a utility fowl (see, also, Color Plate XII).

Moeven, and the Bearded Thuringian, have never been taken up to any great extent by poultry breeders in other countries.

Of the numerous other breeds originating in Europe, there are some of particular interest from the historical standpoint, and others that have had some influence in the origination of more modern breeds. Among these is the Polish.

POLISH

(For Illustration, see Color Plate XII)

In spite of the name given this breed, it is apparent that it did not originate in Poland, but that it is descended from the Italian Polverara, and that early strains had infusions from western Europe and possibly from Russia. Darwin classified all breeds with crests under the term "Crested or Polish."

Outside of certain parts of Europe, the Polish breed is regarded largely as a fancy fowl. In America, to which country Polish were first imported about 1835, as many as eight varieties are recognized as standard, though three colors—Golden, Silver, and White—are subdivided in respect to the presence or absence of a beard; the other two varieties are the White-crested Black (see this page) and the Buff-laced.

HAMBURG

(For Illustration, see Color Plate V)

The several varieties of Hamburg have had diverse origins. The Penciled Hamburg is supposed to have been derived from the Dutch Friesland. The Spangled Hamburg, on the other hand, seems to have originated from an infusion of stocks from Italy with stocks from western Europe. Specimens of the Hamburg breed probably were imported into England and America about 1825, being obtained from Holland, Belgium, and Germany. The Black Hamburg probably had the same origin as the Spangled variety.

The Hamburg varieties were greatly improved in color markings after their importation into England and America.

In America six varieties are recognized—the Golden Spangled, Silver Spangled, Golden Penciled, Silver Penciled, White and Black.

The popularity of the Hamburg has not held its own during recent years, although from the standpoint of beauty there are few birds to compare with a well-marked Silver Spangled.

One characteristic of the Hamburg is the upturned spike at the rear of the rose comb, the spike in other rose-comb varieties normally curving downward to follow the head (see page 450).

A breed frequently referred to as Sicilian Buttercup was imported into America direct from Sicily in 1860, and was given that name from the fact that its plumage in general was yellow and it had a cup-shaped comb. As developed to-day, it is not unlike the Golden Penciled Hamburg, except that for each dark bar in the Hamburg plumage there are two small, elongated spangles in the Buttercup.

RUSSIAN AND HUNGARIAN BREEDS

The majority of the breeds of domestic fowl originating in Russia are developments of those brought in from Asia and western Europe. Practically none of them has obtained much distinction outside of Russia.

The history of the Russian breeds is for the most part obscure. The Orloff, with beard and whiskers; the Pavloff, Russian Dutch, Siberian Featherfooted, Ushanki, Russian Crested, and Russian Rose Comb comprise the family.

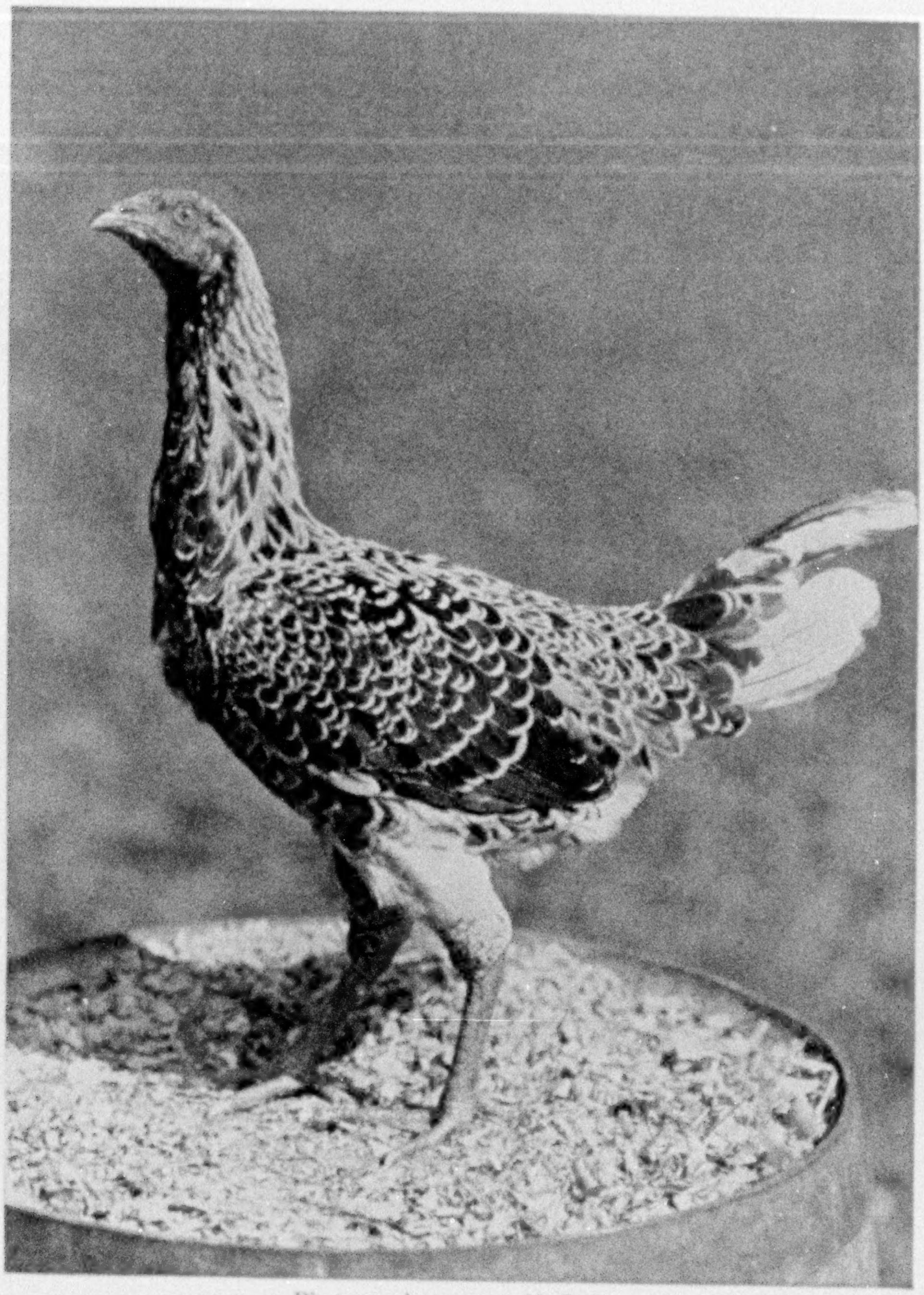
The Hungarians have contributed but little to the development of new breeds. Only two need be considered.

The Magyar is very much like the White Leghorn, from which it is probably descended. Just as the Italian fowl went by way of the Mediterranean to Spain and across the Alps to southern France and Germany, so also it crossed the Styrian Alps into Austria and finally reached Hungary.

The Transylvanian Naked Necks are supposed to have originated in eastern Hungary, and, while not of great economic importance anywhere else, are noted for the fact that the head and about three inches of the neck are bare of feathers. Such a peculiar characteristic is important chiefly from the biological standpoint, inasmuch as it would be very interesting to determine how such a character ever arose (see illustration, page 446).

Recently the bare-neck character has given rise to a very perplexing problem confronting the American poultry industry. Certain enthusiastic individuals have secured bare-necked specimens and have advertised them widely as the product of a cross between the turkey and the fowl.

Such a claim is not founded on established fact, and no records have been published of such a cross. Moreover, if such a cross were possible, the progeny would in all probability be sterile. The turkey and the fowl do not belong to the same species or family and are too distantly related to cross with even the remotest hope of securing progeny.



Photograph courtesy U. S. Department of Agriculture

WHITE-LACED RED CORNISH (SEE PAGE 388)

Its sturdy-looking frame indicates that some of its ancestors were game birds. The White-laced Red variety was developed in America from the original strains, imported from England forty years ago (see, also, Color Plate XI).

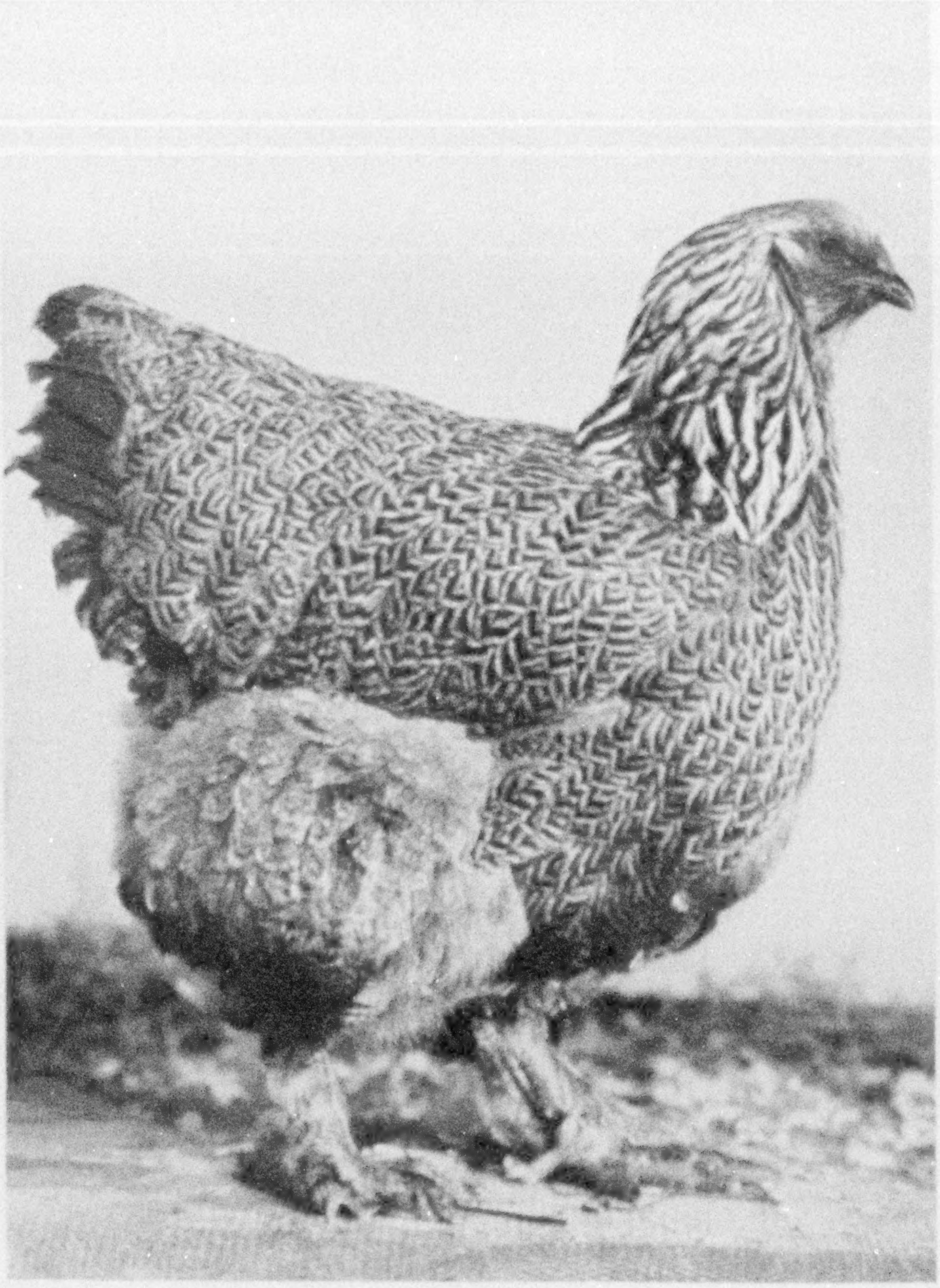
BRITISH BREEDS

The British have always been a sport-loving people and for centuries have enjoyed fox-hunting, steeple chasing, horse racing, rowing and sailing contests, tennis and bowling, soccer and rugby.

Little wonder, then, that such a sport as cockfighting was for many years a popular public institution (see text, page 385).

In addition to the development of birds with fighting qualities, a great deal of attention was given to the fancy interests, especially after cockfighting was suppressed by Parliament in 1849.

Subsequent to 1890 utility qualities received chief consideration and breeds possessing excellent fleshing qualities especially were developed.



Photograph by Arthur O. Schilling

TRIPLE PENCILED DARK BRAHMA

Until the Silver Penciled Wyandottes and the Plymouth Rocks were developed, the Dark Brahma was the only fowl having this peculiarly beautiful color pattern. Triple penciling can be obtained to best advantage only on large fowls with broad feathers (see pages 388-389).

ENGLISH GAME FOWL

(*For Illustration, see Color Plate III*)

During the cockfighting period in the English poultry-breeding industry many varieties of the Indian Game, as it was first known, and then the Game Fowl, as it came to be known, were developed, bearing peculiar names, such as Polecats, Gingers, Custards, Red Duns, Mealy Grays, Cheshire Pyles, Black-breasted Reds, and many others.

A strain of "Shakebags" was also developed, the term being used in reference to the custom of carrying the fighting cock to the scene of combat in a bag, from which the bird was shaken into the pit or arena with its opponent.

These varieties were practically of the same fighting blood, though they differed materially in color. Their bodies were compact, with marked muscular development in wings and legs, and they were close-feathered.

After the abolition of cockfighting and with the advent of poultry shows, the type of Game was altered considerably. There was a lengthening of the neck and legs, shortening of the hackles and tail, reduction in depth of body, and a refinement of the head.

These changes resulted in the production of what was called the Exhibition Game, useless for fighting and of little use economically.

The Exhibition Game was introduced into America shortly after the Civil War and was popular for many years. To-day, in America, eight varieties are recognized as standard—the White, Black, Birchen, Red Pyle, Black-breasted Red, Brown-red, Golden Duckwing, and Silver Duckwing.

CORNISH

(*For Illustration, see Color Plate XI*)

This breed, when first developed, was called the Indian Game, but in America the name was changed to Cornish, by which term it is now known. In its improved form it appears to have been developed in England about the middle of the last century and was produced from crossings involving the Aseel, Malay, and English Game breeds. It proved to be an excellent table fowl and when brought to America in 1887 became popular, largely because it had a yellow skin, which Americans have always regarded as somewhat "richer" than white-skinned poultry.

Three varieties are recognized in America—the Dark, White (see page 398), and White-laced Red (see page 439), the last two varieties having been developed in this country.

DORKING

Among the French breeds is the Houdan, with five toes (see text, page 437) and among the British breeds the Dorking possesses the same characteristic. At what time the fifth toe originated is not known, although Columella, a Roman writer who lived at the beginning of

the Christian Era, and Pliny, the naturalist, whose "Historia Naturalis" was published A. D. 77, both mention domestic fowls possessing five toes. The Dorking seems to have been well established in the Dorking district in Surrey at least 200 years ago.

Several varieties of Dorking were developed in England and some of them were brought to America, apparently in the early eighties. Only three varieties are recognized in this country—the White, Colored, and Silver-Gray (see page 448).

The Dorking is primarily a table fowl and has a good quality of flesh. The standard weights of the Colored and Silver-Gray varieties are: Cock, 9; hen, 8; cockerel, 7; and pullet, 6 pounds. The White variety is about a pound lighter.

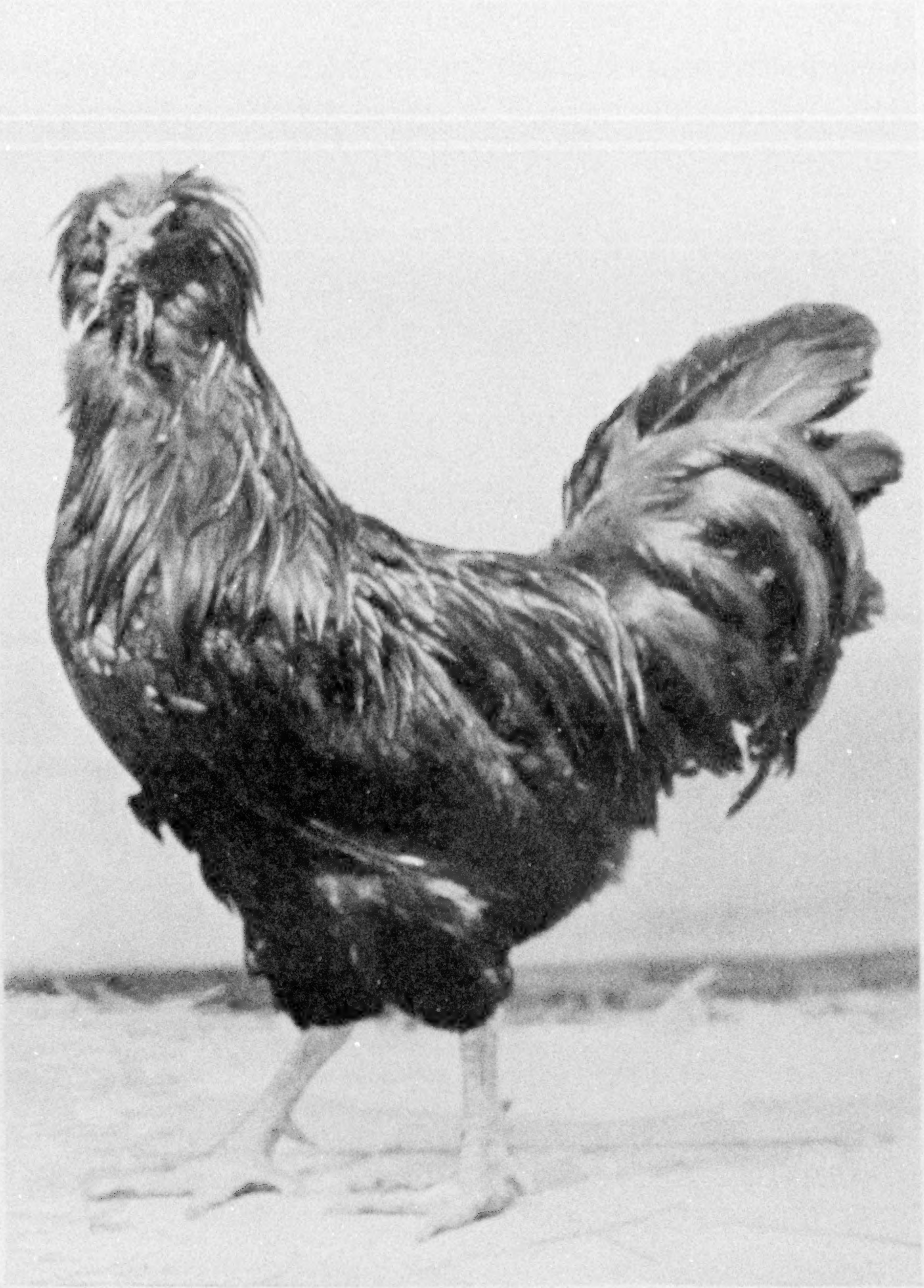
SUSSEX

(For Illustration, see Color Plate X)

The four-toed Sussex appears to have had the same origin as the five-toed Dorking. Its superior fleshing qualities established its popularity in England, and three varieties were developed—the Red, Light, and Speckled.

A few Sussex were brought to America about 1902, and of the two varieties recognized, the Red and Speckled, only the Speckled is kept to any extent. The standard weights are: Cock, 9; hen, 7½; cockerel, 7; and pullet, 6 pounds.

The Speckled Sussex has a reddish-brown ground color, each feather being tipped with white, immediately beneath which is a narrow bar of black. The Red variety is a deep red.



Photograph courtesy U. S. Department of Agriculture

THE BIRD OF THE BROKEN HEART

This French breed, developed principally in the Normandy and Picardy regions of France, derives its name, Crève-cœur from the fancied resemblance of its thick, V-shaped comb to a divided heart. It is descended from the Black Polish (see page 438).

ORPINGTON

The fighting fowls had had their day, the exhibition fowl had passed the zenith of its popularity, and the Dorking and Sussex were adopted for the production of meat. Each kind was a specialty, fitted primarily for a single purpose. It is not surprising to find, therefore, that as the dietary demand for eggs increased, there was a demand for a fowl that would lay well. The Orpington was originated with this idea in mind and is a dual-purpose breed, being adapted for both egg and meat production.

The Black Orpington was the first of several varieties to be originated, the date being 1886; so the breed is quite modern.

Three different breeds were used in making the Orpington—Black Minorca, clean-legged Black Langshan, and Black Plymouth Rock, the last named more probably being black-colored specimens with Plymouth Rock blood.

The Buff Orpington was next developed from the Buff Cochin, the Golden Spangled Hamburg, and the Dark Dorking (see page 449).

The White Orpington in all probability originated as a "sport" from the Black variety, and the Spangled Orpington is said to have resulted from a cross between the Spangled Old English Game and the Dorking, although the Spangled,

Photograph by Richard H. Stewart

FRIENDLY RHODE ISLAND REDS

The son of the author of "Pigeons, Man's Feathered Friends of Longest Standing," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1926, and the son of the staff artist who made the paintings for the Color Series of Fowls, in this number of The Magazine, with two prize "Rhodies" on Mr. Hanson's country estate at Bethesda, Maryland.

Photograph courtesy U. S. Department of Agriculture

EGGS GATHERED FROM HIDDEN NESTS

Such finds frequently contain partially hatched chicks. During the warm season of the year farmers and commercial poultrymen should produce infertile eggs, which do not begin to hatch if sat upon by broody hens or subjected to summer heat.

or Jubilee, Orpington and Speckled Sussex are very similar.

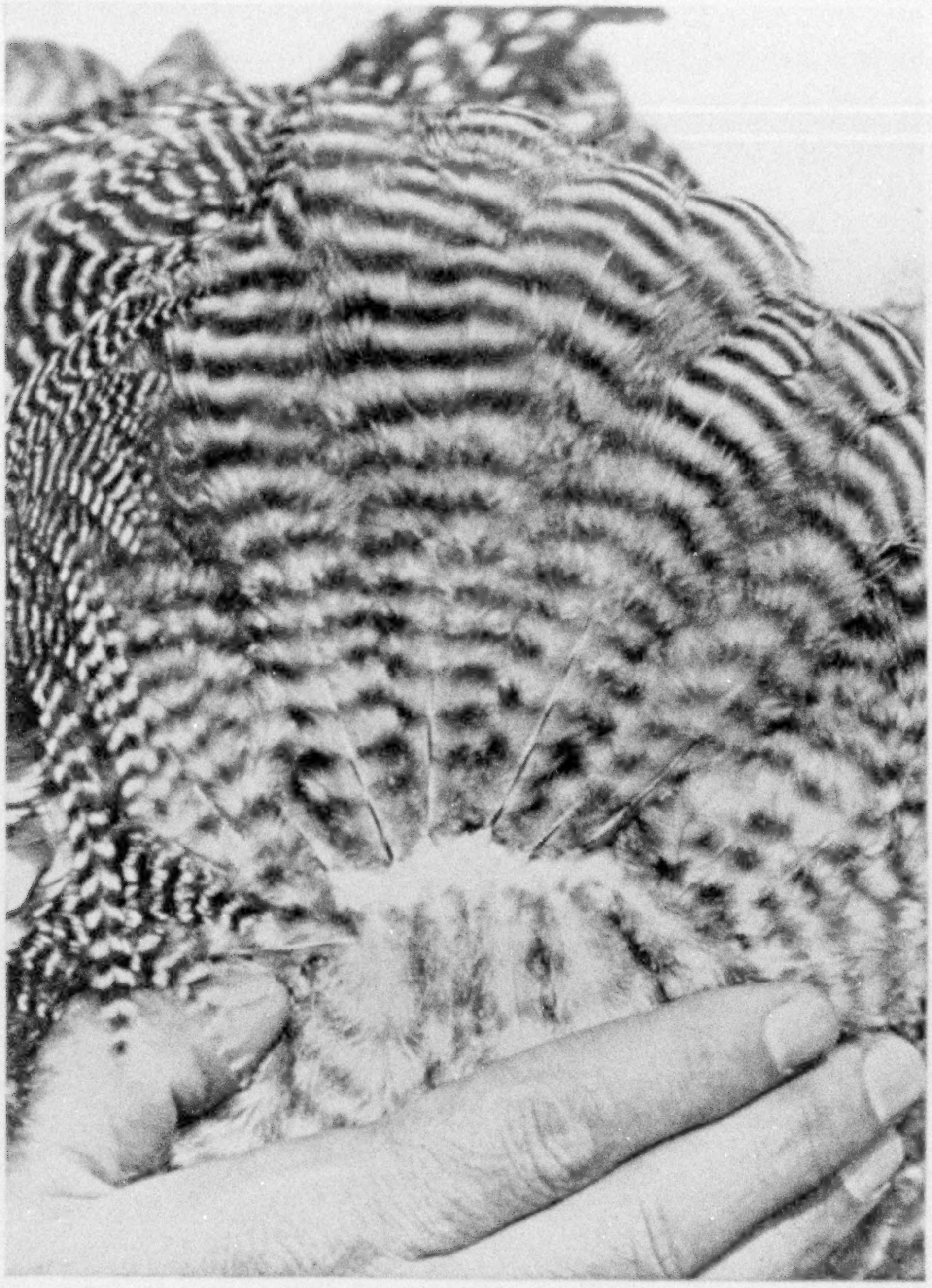
The Orpingtons gained considerable popularity in England and soon found their way to America, where the White and the Buff varieties were widely taken up. The Black variety never became popular in America, but in Australia it has proved to be one of the world's best layers. More recently it has been reintroduced into America, this time from the West Coast, in a modified form, under the name of the Australorp.

In addition to the Black, White, and Buff Orpingtons, a blue variety, developed relatively recently in England, is also recognized in America.

The Orpington is a utility breed, with good fleshing properties and laying ability. Probably the principal reason why it has not maintained its one-time popularity in America is that it has a white skin, and American consumers prefer a yellow skin (see under Cornish, page 440). The standard weights are: Cock, 10; hen, 8; cockerel, 8½; and pullet, 7 pounds.

While England has produced many breeds and varieties of fowl, it is a noteworthy fact that Scotland has produced only three—the Scotch Bakies, or Dumpies, the Dumbartonshire, and the Scotch Gray—the last being the only one that has attained any importance.

The ancestry of the Scotch Gray remains in obscurity. It has never gained popularity outside of Scotland, and, having somewhat the same plumage color as the more recently developed Barred Plymouth Rock, can never be expected to become important in the American poultry-breeding industry.



Photograph courtesy U. S. Department of Agriculture

FLUFF OF BARRED PLYMOUTH ROCK MALE, SHOWING DEFINITE UNDER BAR

Plumage color-patterns are usually determined by the manner in which the pigment is laid down in each particular feather. The irregularly barred feathers of the early Dominique (see Color Plate III) were developed into the remarkable parallel barring of the modern Barred Plymouth Rock (Color Plate VIII), in which black pigment granules were laid down in parallel bars on what would otherwise be white feathers (see pages 388 and 390).

AMERICAN BREEDS

Domestic fowls found a place in the diet of the earliest white settlers in America. Captain John Smith writes of Jamestown in 1609: "As for our hogs, hens, goats, sheepe or horses, or what lived, our commanders, officers, and salvages, daily consumed them, some small proportions sometimes we tasted, till all was devoured."

According to chronicles of these times, eggs were also appreciated, but for the most part were eaten during the warm seasons of the year.

Poultry keeping was soon common among the Indians, who, by purchase or by theft, supplied themselves with stock. Among the white settlers poultry was kept to a limited extent only, until the early part of the nineteenth century. The most frequent mention of poultry products in newspapers before that time was of feathers for beds and pillows.

By the middle of the nineteenth century the

Photograph courtesy U. S. Department of Agriculture

A BLACK SUMATRA GAME MALE

This breed of emigrant from the Dutch East Indies arrived in America eighty years ago, after cockfighting had lost favor (see text, page 415).

keeping of fowls for the production of meat and eggs was becoming a relatively important industry near all the larger cities, and its development has proceeded since with tremendous strides, until to-day poultry in the United States ranks sixth in value of all agricultural industries (see, also, "America's Debt to the Hen," beginning page 453).

The various breeds of poultry that have been developed in America are outstanding for their utility qualities.

Asiatic fowls were first imported in considerable numbers shortly after 1850, and their popularity led to the first "hen fever" in the fifties, after which a rapid succession of breeds claimed attention.

At that time the principal improved breeds were the Dorking, Polish, Java, Game, Dominique, Jersey Blue, and Bucks County. By 1849, when the first poultry show in America was held at Boston, a number of other breeds had become fairly well known.

The first organized effort to place the breeding industry upon a stable basis took place in 1873, when the American Poultry Association was organized to formulate and adopt a standard of excellence to be used exclusively by poultry associations in awarding prizes on exhibition poultry.

A complete standard was adopted for all the then-recognized varieties of domestic and ornamental classes of poultry, and in 1874 the first "Standard of Perfection" was printed. Since that time the "Standard," revised periodically, has served as the basis of guidance in breeding operations in developing many breeds and varieties.

Poultry exhibitions have exercised a remarkable influence in maintaining high standards of excellence. The numbers of standard breeds and varieties recognized by the American Poultry Association are as follows: Chickens, 42 breeds and 74 varieties; turkeys, 6 varieties; geese, 6 breeds, including 1 breed with 2 varieties; ducks, 11 breeds, including 3 with 7 varieties.

DOMINIQUE

(For Illustration, see Color Plate III)

Purely barred chickens of relatively small size and usually with rose combs were common in many parts of the eastern United States as early as 1750. As interest in poultry breeding increased, more attention was given to the improvement of these barred chickens, until they came to possess a fair degree of uniformity in type and were more or less the same size. However, they had both rose and single combs, and about the time of the first poultry show at Boston (see page 385), these rose comb barred chickens came to be recognized under the name of "Dominique."

The origin of this term itself is in doubt, and after it was decided upon there was still greater improvement in the type and in other qualities of the breed.

Interest in the Dominique soon waned, largely because newer breeds of greater economic importance were quickly developed. To-day, relatively few Dominiques are to be found anywhere in the United States.

Photograph courtesy U. S. Department of Agriculture

WHITE-FACED BLACK SPANISH, ORIGINATED IN SPAIN

Fanciers in America have developed this fowl, which was the progenitor of the Blue Andalusians (see text, page 420).

PLYMOUTH ROCK

(For Illustration, see Color Plate VIII)

An accurate history of the origin of the Plymouth Rock breed of poultry would make a very long story. The earliest variety of the breed was the barred, and until other varieties appeared the birds which later came to be known as Barred Plymouth Rocks were simply called Plymouth Rocks.

While the Barred Plymouth Rock seems to have come from at least three fairly distinct strains, Robinson, a leading American authority on the origin of American breeds and varieties, says it owes much of its history to the Dominique. Both have the barring factor, and when the Dominiques were established as a rose-comb breed the single-comb birds of the same breeding were in a large measure developed into the Barred Plymouth Rock.

The three distinct strains in the improved Barred Plymouth Rock are the Drake, originated about 1866, at Stoughton, Massachusetts, the original stock probably being single-comb barred birds; the Sussex County, from Massachusetts, going as far back as 1856; and the Upham, or Spaulding-Upham, which came from Connecticut about 1865.

These three strains were developed independently of one another. The "hawk" colored birds used were the Dominiques. Cochins and Dorkings were the two breeds used to a greater extent than any others, and the early Plymouth Rocks were of pronounced Dorking type.

Photograph courtesy U. S. Department of Agriculture

A TRANSYLVANIAN NAKED NECK

The head and three inches of the neck of this peculiar fowl are bare of feathers. This characteristic, the origin of which is unknown, makes the breed important biologically (see pages 407 and 439).

The Plymouth Rock has enjoyed wide and increasing popularity. The quality of barring has been improved very materially, until in some specimens to-day it is possible to pluck several feathers from different sections of the body and match them very effectively because of the narrow, straight barring. (See color inheritance, pages 397 and 443.)

In the breeding of Barred Plymouth Rocks there is a decided tendency for the males to come lighter in color than the females, and for this reason many breeders resort to two separate matings—one for the production of males of standard color and the other for the production of females of standard color. This system is known as double mating.

To produce males of standard color, a standard-colored sire is mated to medium-dark dams, or dams two or three shades darker than females of standard color. This is known as the cockerel mating.

To produce females of standard color, dams of standard color are mated to a medium light sire or one that is two or three shades lighter than males of standard color. This is known as the pullet mating.

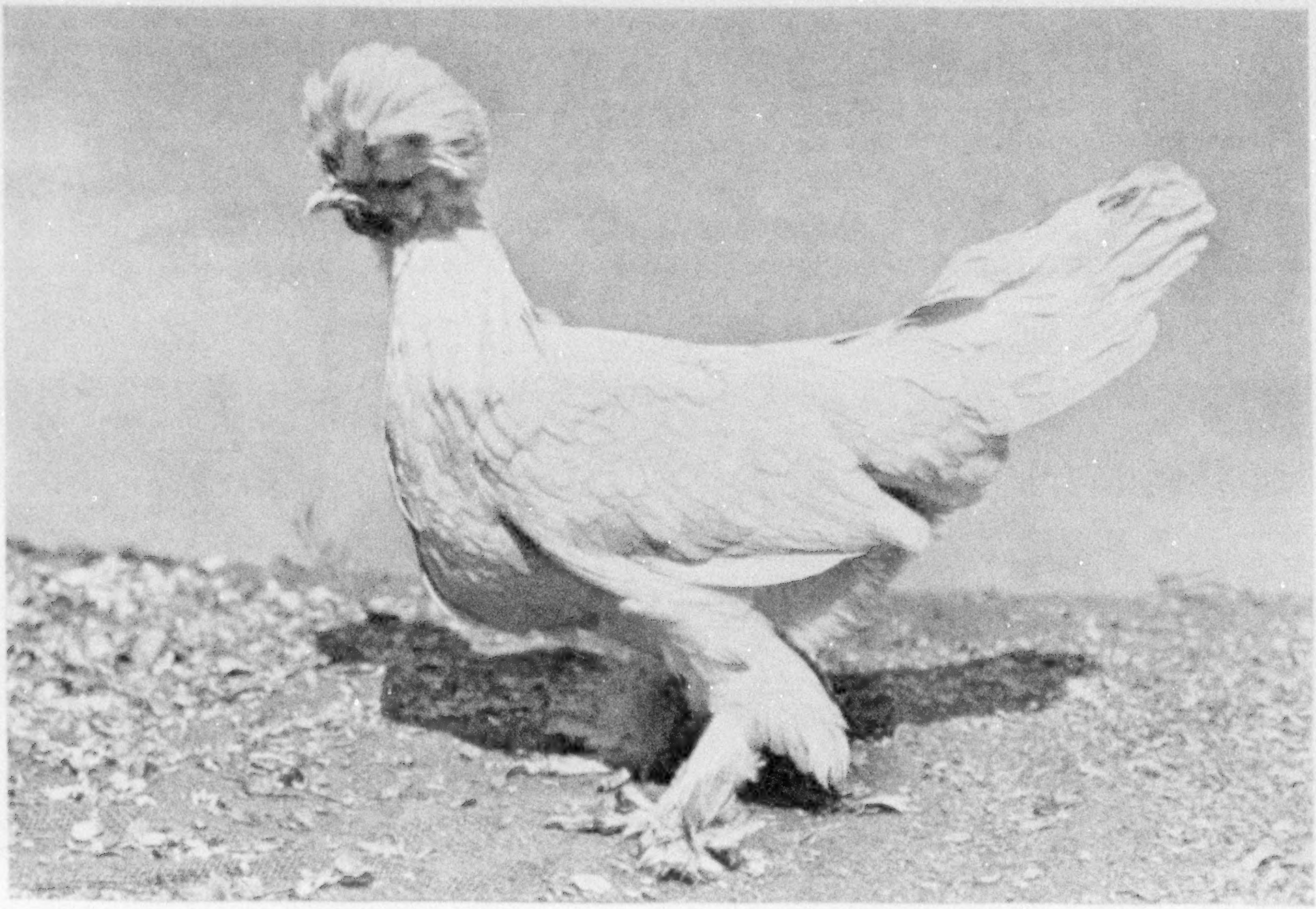
The second variety of Plymouth Rocks to be developed was the white (see page 398), which, in all probability, originated as a "sport" from the barred variety. It is quite possible, however, that other strains of White Plymouth Rocks were derived from crosses of White Dorkings and White Cochins, and it is also possible that White Dorkings were crossed with Barred Plymouth Rocks, and then the white-color factor was extracted from subsequent generations.

It has been demonstrated in a number of Barred Plymouth Rock flocks that it is possible to develop a flock of White Plymouth Rocks, provided white chickens happen to be produced from a mating of two barred birds. There is at the United States Experiment Farm, Beltsville, Maryland, a flock of White Plymouth Rocks that has been developed entirely from an original flock of Barred Plymouth Rocks.

Strange as it may seem, the Buff variety was developed in an entirely different manner from the Barred and apparently has no relation to it. Two strains of Buff Plymouth Rocks were originated about 1890, one being developed from single-comb Rhode Island Reds, which were common in Rhode Island at that time, although not recognized under that name; the other from crosses of White Plymouth Rocks and Buff Cochins, and here again is evidence of the great extent to which Cochin blood has been used in the origination of American breeds.

Other varieties of Plymouth Rocks include the Silver Penciled, which, to a considerable extent, owes its feather markings to Dark Brahma blood; the Partridge, or Golden Penciled, Plymouth Rock, developed apparently from Partridge Cochins and Brown Leghorns, and possibly by mating Partridge Cochins on

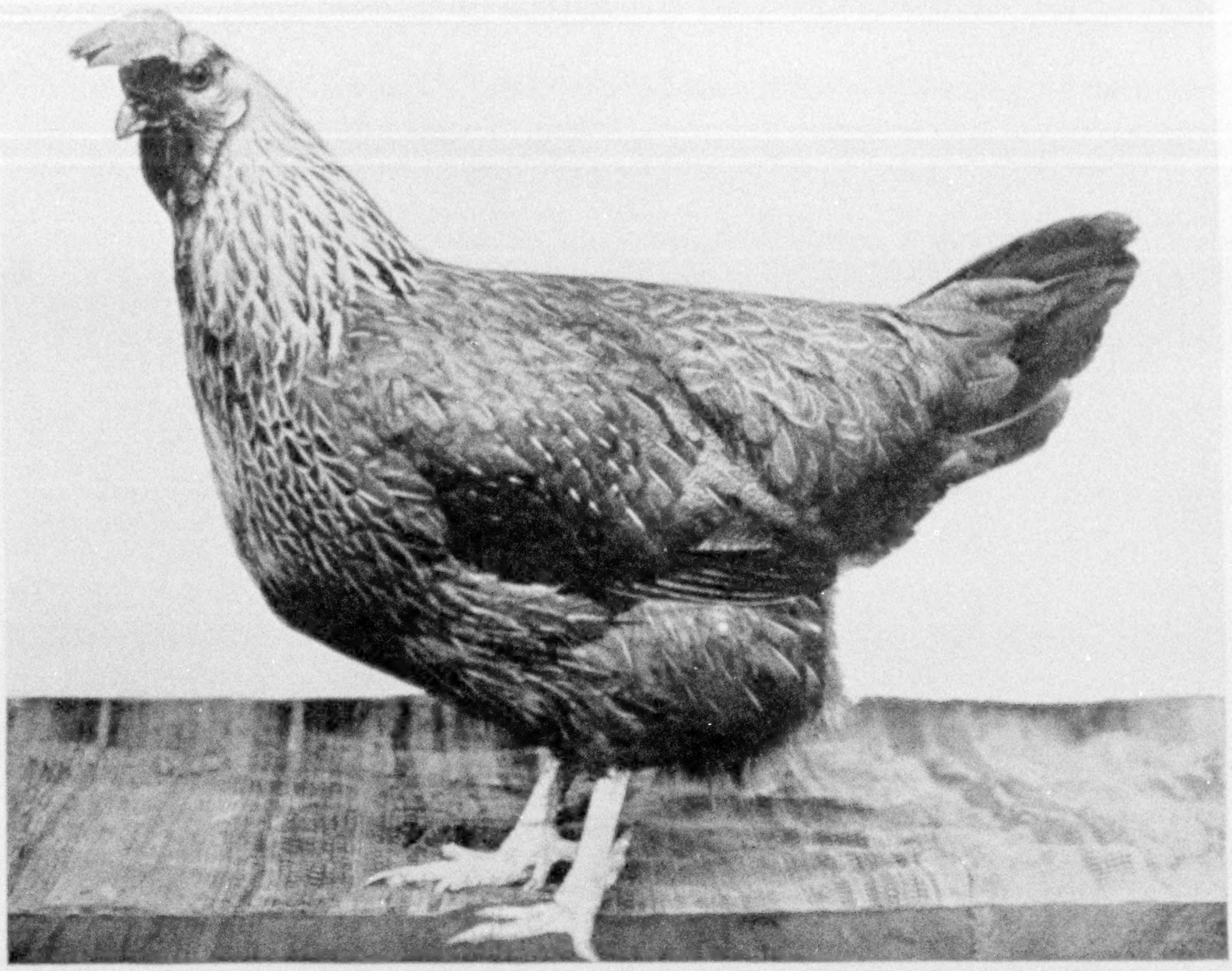
A SULTAN COCK



Photographs courtesy U. S. Department of Agriculture

A FEMALE SULTAN

Besides crest, muff, beard, and feathered shanks, this white breed of medium size also has vulture hocks—an unusual characteristic in the poultry world. The Sultan was imported to Europe from Turkey in the 19th century (see pages 407 and 452).



Photograph courtesy U. S. Department of Agriculture

A FOWL WITH FIVE TOES, THE SILVER-GRAY DORKING

The breed is an old English type, developed as a table fowl for the London market (see page 440).

other breeds as well, and the Columbian Plymouth Rocks, which were originated somewhat later than the other varieties, from crosses between Light Brahmas and White Plymouth Rocks. In many cases single-comb Columbian Wyandottes have been developed into Columbian Plymouth Rocks; "Columbian" means the same color pattern as the Light Brahma, Color Plate IV.

Plymouth Rocks have single combs and represent essentially a utility fowl, being of good size, the cock weighing 9½; hen, 7½; cockerel, 8; and pullet, 6 pounds. They make excellent table poultry, because the shape of the body is such as to provide for excellent fleshing properties. Plymouth Rocks are also good egg producers if properly bred for that purpose.

WYANDOTTE

(For Illustration, see Color Plate IX)

The first Wyandottes appear to have been originated about 1860, for the most part from crosses of breeds introduced into America just prior to that time.

Wyandottes were developed as a smaller breed than the Plymouth Rocks, being approximately one pound lighter. They were also shorter in the back and body and somewhat lower set. They were admitted to the "Standard of Perfection" in 1883 and have been relatively popular since that time.

There are many varieties of Wyandottes. The Silver Laced comes from crosses between the Buff Cochins and Silver Sebright Bantams and between Dark Brahmas and Silver Spangled Hamburgs.

The White Wyandotte, as in the case of the Plymouth Rock, originated as a "sport" from the original variety of the breed.

The Golden Laced Wyandotte is the counterpart of the Silver Laced, with the exception that a factor for gold coloring replaces that for silver. It was derived from a variety of crosses, in which the blood of the Silver Laced Wyandotte, the Partridge Cochin, the single and rose comb Brown Leghorn, and the Buff Cochin were used.

The Buff Wyandotte is of comparatively recent origin, having been developed about 1890. Here, again, different blood infusions were used, some strains having come from fowls which were common in Rhode Island at the time and later becoming a standard breed with the name of "Rhode Island Red." Some strains of Buff Wyandottes were produced by mating Golden and White Wyandottes with Buff Cochins, while others were produced apparently from Cochin and Hamburg crosses.

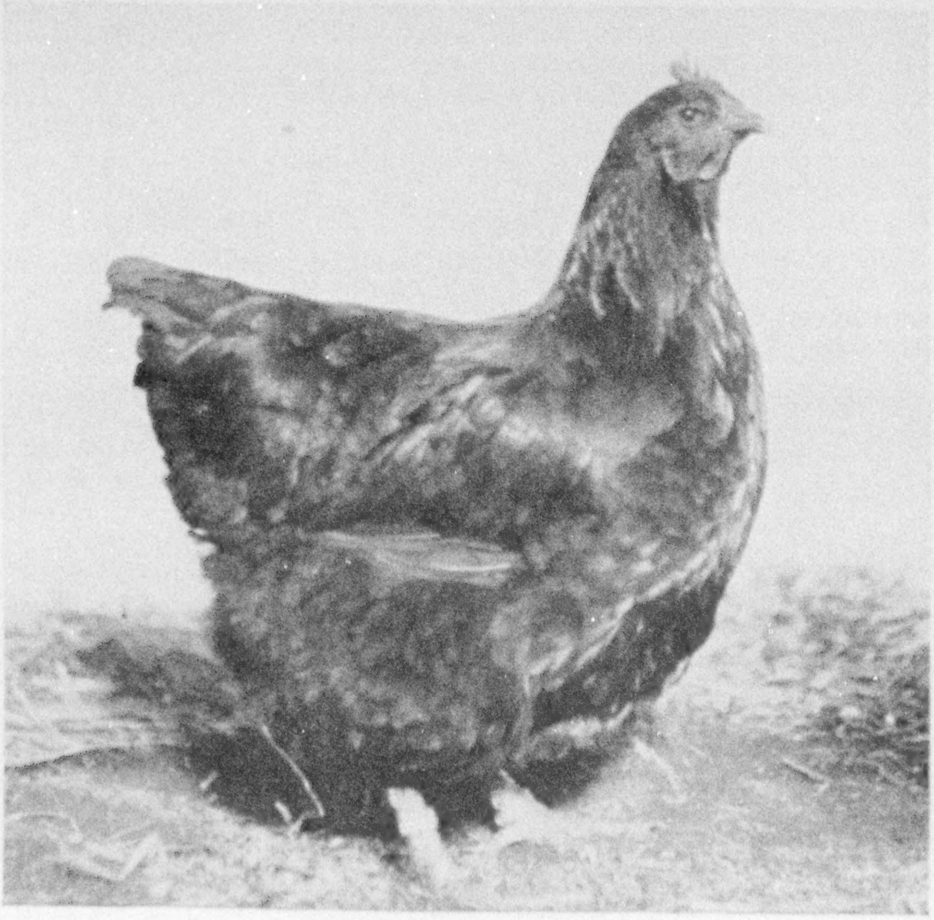
These various crossings, used to produce the same general type and color of bird, demonstrate in no uncertain way the plasticity of the various breeds and varieties of domestic poultry. The same principle has been demonstrated time and time again in the development of new varieties of several of the breeds.

The Partridge Wyandotte has triple golden penciled plumage and appears to have been originated between 1890 and 1896. Two strains seem to have been developed originally, one involving a cross between the Golden Laced Wyandotte and the Golden Penciled Hamburg, the other being produced from blood of the Golden Laced Wyandotte, Partridge Cochin, Cornish, Brown Leghorn, and Buff Cochin. Later the two strains of Partridge Wyandottes were fused and the penciling character was greatly improved.

The Silver Penciled Wyandotte is the counterpart of the Golden Penciled variety, with the silver factor replacing the golden factor. Naturally, the Dark Brahma was used in originating it, the other varieties used including the Partridge and Silver Laced Wyandotte and the Silver Penciled Hamburg.

The Columbian Wyandotte in plumage color is the counterpart of the Columbian Plymouth Rock and the Light Brahma. It is supposed to have come from a mating between a Barred Plymouth Rock cock and a White Wyandotte hen, although this is highly problematic, inasmuch as the barring factor is dominant to the white factor in the White Wyandotte and barred chicks only would be produced from such a mating. It seems more probable that the Columbian Wyandotte resulted from matings between Light Brahmas on other breeds and possibly from mat-

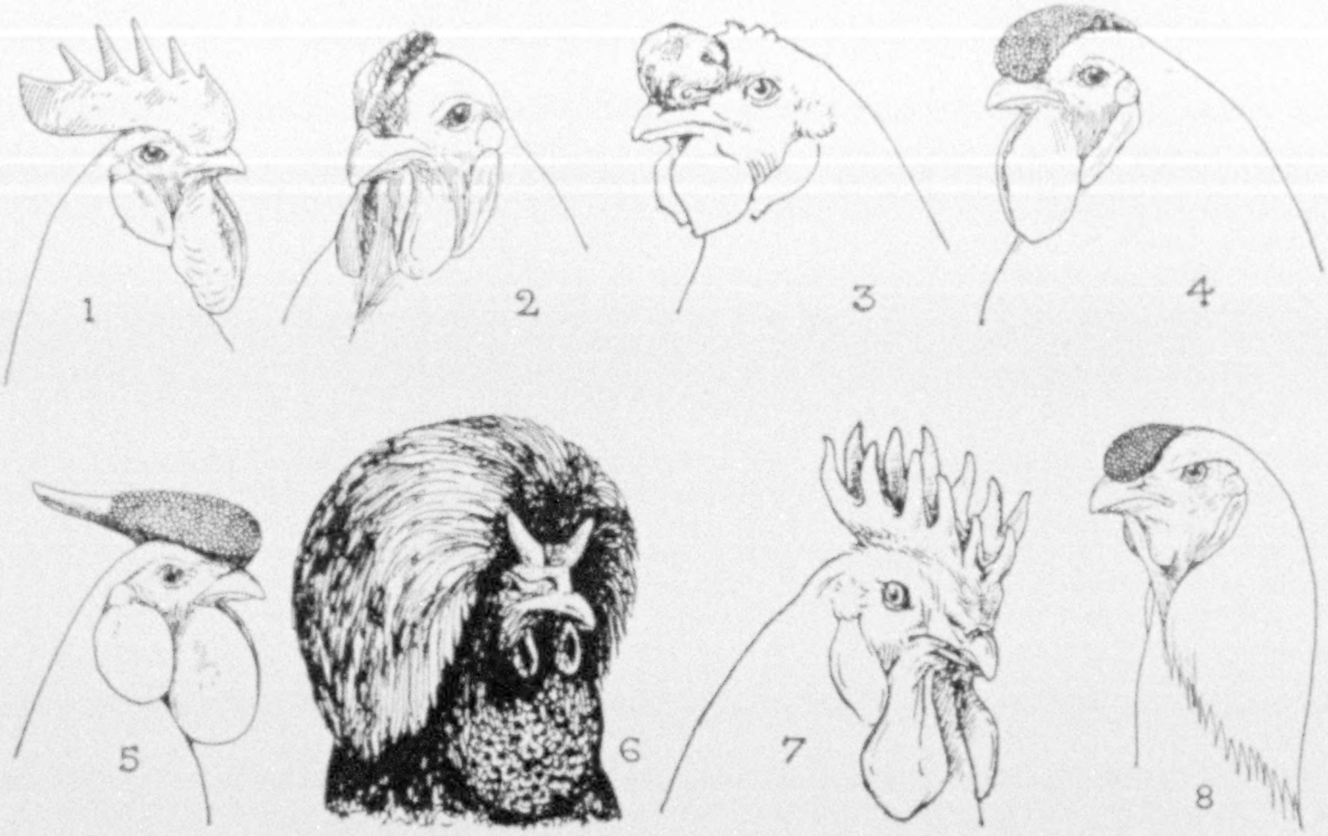
SINGLE COMB BUFF ORPINGTON COCK



Photographs courtesy U. S. Department of Agriculture

SINGLE COMB BUFF ORPINGTON HEN

The Orpington is England's greatest dual-purpose breed, adapted both to meat and egg production (see text, page 441). The Australians have obtained remarkable records in egg laying from the Black variety.



HEADS OF MALE FOWLS SHOWING DIFFERENT TYPES OF COMBS (SEE PAGE 401)

1, Single; 2, Pea; 3, Walnut; 4, Rose; 5, Rose; 6, V-Shaped; 7, Buttercup, and 8, Strawberry.

ings between Columbian Plymouth Rocks and Wyandottes.

The Black Wyandotte appeared about 1885 from black "sports" of the Silver Laced variety.

The Wyandotte has long been a popular fowl in America, both with fanciers and commercial poultry producers. It is a bird of good size, although smaller than the Plymouth Rock, the standard weights being: Cock, 8½; hen, 6½; cockerel, 7½; and pullet, 5½ pounds.

The Wyandottes have a rose comb and the general type of the body is fairly short and quite broad, making it an excellent table fowl. Many fine layers have been produced.

RHODE ISLAND RED

(For Illustration, see Color Plate VIII)

There are two subvarieties of the Rhode Island Red, differing in form of comb only, single and rose. This breed has a comparatively simple origin. In the early days of the 19th century Rhode Island fowls were noted for their excellence. The State was in a favorable position to supply the markets with high-class produce and a great deal of attention was given to poultry raising.

Some of the early strains kept in Rhode Island from about 1800 to 1850 or 1860 were produced by mating Red Malay game cocks to the common hens of the country. Other strains were produced by mating rose-comb Brown Leghorn males with mottled females. As the poultry industry of the State grew, the flocks became pretty much of the same general type, although they were all recognized as just common fowl. The name "Rhode Island Red" was given to the breed about 1879 or 1880, when it was first exhibited.

The Rhode Island Red is of the same general utility as the Plymouth Rock and Wyandotte. It has proved to be an excellent fowl in the hands of breeders and is very popular among poultry producers. It is the right shape and size to make it a desirable table bird and can also be bred to a high stage of prolificacy. The plumage color is rich red over all parts of the body, except that the tail is black and the primary and secondary wing feathers have considerable black. The lowest neck feathers of the female are tipped with black. The standard weights are the same as for the Wyandottes.

A comparatively new fowl, the Rhode Island White, admitted to the American "Standard of Perfection" only five years ago, is a white breed of Rhode Island Red type and was produced from crosses of Partridge Cochins, White Wyandottes, and Rose Comb White Leghorns (see page 398).

JERSEY BLACK GIANT

(For Illustration, see Color Plate IV)

Thirty years ago, in parts of New Jersey and eastern Pennsylvania, considerable attention was given to the production of large-sized birds with excellent fleshing qualities for the New York and Philadelphia markets. On the farms in those sections strains were developed that came to be fairly uniform in type, but were larger than the then-recognized American breeds, and derived very largely from Asiatic sources.

Within the last fifteen years definite efforts were put forth to make this high-quality roast-

ing chicken into a definite breed, and it was finally named the "Jersey Black Giant." The standard weights are: Cock, 13, hen, 10; cockerel, 11; and pullet, 8 pounds. The skin is yellow, as in the case of other American breeds, but the beak and shanks are black.

The Jersey Black Giant has won considerable popularity and may be expected to provide high-class roasting chickens for the larger Eastern markets.

CHANTECLER

The Chantecler is the only breed of poultry recognized in the American "Standard of Perfection" which was originated in Canada. It was developed at the Institute Agricole D'Oka, connected with the monastery of that name.

The first work in developing this new breed was started in 1908, and for a period of ten or twelve years various breeds were used, careful selection being carried on all the while. The first cross was between a Cornish male and a White Leghorn female; another between the Rhode Island Red male and White Wyandotte female. The progeny of these two crosses were then mated, and from that mating females were selected which were mated to a White Plymouth Rock male.

Selections were made and the flock was divided into two parts, selection and continued inbreeding being carried on with one, while with the other part females were mated to a White Wyandotte male and selection continued.

A little later White Plymouth Rock blood was again used and selection was continued, until finally a uniform flock was developed very much of the same type as the Buckeye, a variant of the Rhode Island Red, the chief difference being that the Chantecler has a cushion comb, while the Buckeye has a pea comb (see illustration, page 398).

BANTAM BREEDS

There is a vast array of Bantam breeds possessing great variety in body type, feather contour, and plumage colorations. Weird and fantastic types have been developed, in many cases strikingly beautiful, in some extremely grotesque.

These pygmy creatures of the avian world are objects of great interest, even if not of utility. "If eyes were made for seeing, then beauty is its own excuse for being." This alone is sufficient justification for the existence of such a large number of Bantam breeds and varieties extending all the way from pygmy Cochins and Langshans to the diminutive games that weigh but a few ounces each.

While man's fancy has led him to develop dwarf forms of many of the larger domestic fowls, in the majority of cases the Bantam forms that have proved most popular are those for which there are no counterparts in the larger breeds.

Comparatively little is known concerning the origin of the Bantams, and, moreover, to discuss their characteristics would duplicate very largely material which has preceded.

The number of Bantam breeds recognized by the American Poultry Association and described in the "Standard of Perfection" is limited, for the most part, to two classes—game and ornamental. The game Bantams are exact counterparts of the larger standard varieties except in size. They include the Black Breasted Red, Brown Red, Golden Duckwing, Silver Duckwing, Birchen, Red Pyle, White Game, and Black Game. The standard weights for all these varieties are: Cock, 22; hen, 20; cockerel, 20; and pullet, 18 ounces.

There is also a breed known as the Black Breasted Red Malay Bantam, which is the counterpart of the larger Malay breeds except for size.

Among the ornamental Bantams recognized as standard varieties are the Golden and the Silver Sebright, White and Black Rose Comb, White Booted, Light and Dark Brahmas, Buff, Partridge, White, and Black Cochins, the White, Black, Gray, and Black Tailed Japanese; Bearded White, Buff, Laced, and Non-bearded Polish, and, finally, the Booted Mille Fleur. Many of these varieties have outstanding characteristics either in type or plumage coloration.

The Sebright Bantam (see Color Plate XV) appears to be the only breed of fowl named after its originator, Sir John Sebright, of England. The Silver variety has white feathers, each laced with black, and is more striking in appearance than the Golden variety, where the white is replaced with golden bay.

The feathers over all parts of the body in both male and female are marked in the same manner, the male Sebright resembling the Campine, which is also hen-feathered. The Sebright is a small bird with a characteristic carriage which gives it a very bold appearance.

The White and Black Rose-comb Bantams are counterparts of the Hamburgs and are extremely graceful (see Color Plate XVI).

The White Booted Bantams resemble the White Cochin Bantams to a considerable extent, but differ from them in having vulture hocks and a more upright carriage.

The Brahma and Cochin Bantams in plumage coloration are counterparts of similar varieties in the larger breeds.

The Japanese Bantams (see Color Plate XIV) present a unique appearance, with their large combs, wings, and tails, which appear to be out of all proportion to the rest of the body. The tails have very characteristic carriage and long sickle feathers, in the male pointing almost straight upward over the back. The legs are very short.

The Mille Fleur Bantam (see Color Plate XV) is of comparatively recent origin and, as the French name suggests (meaning a thousand flowers), has a variegated plumage resembling somewhat the pattern of the Speckled Sussex (see Color Plate X). The color of the plumage is red, each feather being tipped with white and having a black bar between the red and white.

This Bantam has a beard and muff as well as heavily feathered shanks and feet, and with its mottled plumage pattern is quite an attractive bird.

MISCELLANEOUS BREEDS

The ingenuity of mankind in developing something new, whether it be regarded as an improvement upon Nature or not, is exemplified in the color combinations and structural changes in many breeds and varieties of domestic fowl.

Imagination seems to have run riot, if it be true that the mind of man first conceived of the odd characters possessed by a number of breeds noted solely for their oddity. Among these, the following are of special interest.

YOKOHAMA

(For Illustration, see Color Plate I)

One of the most interesting and beautiful sights of poultrydom is a Yokohama cock accompanied by his consorts and with his 12 to 15-foot tail lying in graceful curves. There are two color varieties, the white, originally called the Yokohama, and the colored, frequently called the Phœnix, but more recently they have all been referred to as Yokohamas.

Not many breeds of fowl developed in Japan have made their way outside of that country, but the Yokohama, with its marvelously developed saddle and tail feathers, is known throughout the world. It has been bred in Japan for many hundreds of years and is said to have been known in Korea (Chosen) before A. D. 1000. The finest specimens are now to be found in Shinowara, in the Province of Tosa, on the island of Shikoku.

In former times long feathers were used in heraldry and were worn as decorations by high Japanese officials, and in this way the breeding of the Yokohama fowl was greatly encouraged.

The care and feeding of the males present quite a problem. Special cages are provided, where they can roost sufficiently high, so that their feathers do not reach the ground.

When the cock is removed from the cage for exercise, the tail is frequently carried by an attendant.

The Yokohama's food is especially nourishing, and it is reported that a feather growth of six inches a month is attainable. The longest feather of which there is a record was 20 feet 2 inches.

RUMPLESS

If there can be fowls with extremely long tails, so surely there can be fowls with very short tails or no tails at all, as in a breed called the Rumpless. This condition is caused by the absence of the six posterior caudal vertebræ and the last bone of the tail, the pygostyl, so that there are no saddle or tail feathers, and the bird is more odd looking than beautiful.

Two lines of Rumpless fowls have been developed, one in Japan (see page 416) and the other in Central Africa. The latter has been domesticated by the natives as well as by the Boers.

The Rumpless breed at one time was quite common in Belgium, where it was known as the Walloon. Not all rumpless chickens are descendants of the original Rumpless breed, for rumpless chickens sometimes appear in a flock of ordinary fowls, as a result of an accident during development within the egg. Such rumplessness is not inherited.

SILKIE

(For Illustration, see Color Plate XIII)

Undoubtedly a Negro fowl would be regarded as a myth by most people, but here is a fowl with black pigmented skin and "silklike" feathers—that is, without webs. It was formerly referred to by naturalists as the Negro fowl, and has been in existence for many centuries. At one time this breed was quite common in Java, in some parts of northern Asia, and later was bred in Paraguay, Argentina, and other parts of South America.

The most common variety has white feathers, but a variety with black feathers was developed in Japan.

It is a bird of medium size with a rounded comb, crest, purple face, and feathered shanks, and is of interest in a study of the probable origin of the pigmentation character. Its ancestry is not known (see page 402).

FRIZZLES

(For Illustration, see Color Plate XII)

The members of this breed are more singular than agreeable to the eye. Centuries ago, in Java, Japan, and southern Asia, fowls were common which possessed the unique character of having the feathers turned upward at the end, giving the birds a much-ruffled appearance.

Comparatively nothing else is known of the ancestry of the Frizzle, and if the breed is perpetuated it is only because of its oddity (see page 402).

ARAUCANA

(For Illustration, see Color Plate XIII)

This unique breed was discovered in South America in 1914. It is the only domestic fowl that lays a blue-shelled egg, all other breeds laying either brown- or white-shelled eggs.

Bred in Chile and probably other South American countries, the origin of the Araucana has not been established, but is being studied.

The color of the Araucana varies considerably and, besides laying a blue egg, the fowl has a peculiar growth of feathers on each side of the neck, at the juncture of the head and neck, and it is rumpless.

SULTAN

The Sultans were first imported into England in 1854 from Turkey, where they were known as the "Serai-Taook," or "Fowls of the Sultan." They resulted, apparently, from a cross between the White Polish and the Booted White Bantam.

This white fowl of medium size has crest, muff, beard, and feathered shanks, also vulture hocks, a character which is unusual in the poultry world (see pages 407 and 447).

AMERICA'S DEBT TO THE HEN

By Harry R. Lewis

FOR untold centuries the hen has been a companion of man in the onward march of civilization.

In America, where poultry husbandry has attained its greatest development, the hen has become one of our leading national assets, growing in the past fifty years from a neglected side line on the average farm to a position where she is considered by the farmer as a very efficient contributor to his yearly income.

The hen might be termed a universal favorite, in that a greater number of persons are interested and actually concerned with poultry than with any other form of live stock.

The hen is becoming more and more a source of our food supply. From 1920 to 1924 the increase in chickens in the United States was 43 per cent and the increase in egg production was 20 per cent.

In 1923 the farm value of poultry products exceeded by more than $150,000,000 the value of all cattle raised, by nearly $300,000,000 the value of wheat raised, and by approximately $400,000,000 all fruit and fruit products.

The value of our poultry products is exceeded at the present time by only five other agricultural commodities — dairy products, corn, cotton, hay and forage, and swine.

The yearly value of the products of the American hen has already passed the billion-dollar mark.

The great bulk of poultry and eggs produced in the United States comes from the Corn Belt States of the upper Mississippi Valley. In fact, more than one-half of our poultry population, or approximately 200,000,000 chickens, is found in what are known as the North Central States. In this big, general-farming area practically every farm possesses moderately small flocks, ranging from 50 to 200 or 300 birds to the farm.

NEW SOCIAL CONDITIONS

For many years a considerable proportion of our poultry population was kept in back lots of city and suburban communities by persons primarily engaged in some remunerative occupation. Poultry was raised largely for pleasure and as a hobby, and incidentally to insure a goodly supply of fresh eggs and meat for the family table. Until the close of the World War, the number of birds so kept numbered hundreds of thousands.

Surveys made a few years ago in eastern urban and suburban areas showed an average of one bird to every two people. Such flocks, averaging from 10 to 25 fowls, were usually well cared for and consisted of birds of high quality.

The postwar period has witnessed the gradual disappearance of many of these back-lot poultrymen. City and suburban poultry houses have been remodeled into garages to shelter the family motor car, for the average suburban dweller no longer takes his pleasure in caring for chickens, but prefers to go to the movies, listen to the radio, or ride in his car.

This change in habits among a great mass of our population has fortunately been accompanied by the development of large commercial poultry farms and specialized henneries, which have found popular favor not only on the North American Continent, but in many Old World countries. The owners of such farms give their entire time to the care of their flocks and in many instances employ additional labor, the land areas of such enterprises covering from five to hundreds of acres.

Commercial poultry farms are especially successful near large centers of population, where the demand is for a strictly fresh, new-laid egg and fresh-killed poultry. Hundreds of such enterprises are being successfully operated in the Atlantic and Pacific Coast States. The eastern sections produce especially for the New York trade, and the Pacific coast sections, after meeting the demands of the larger Pacific coast cities, ship their eggs to the Atlantic seaboard, where they find a ready market at attractive prices.

The production of eggs under these conditions is rapidly assuming factory proportions.

Photograph courtesy U. S. Department of Agriculture

A LIVE-POULTRY TRAIN

The birds are brought from scattered points to concentration centers, where they are loaded into specially designed freight cars and moved rapidly to the poultry terminals of the large cities. Each car will accommodate about 4,600 chickens and is equipped with a water tank, a grain crib, and a "stateroom" for the attendant, who is sent by the shipper to accompany and care for the fowls. This method of transporting live fowls has proved very successful, the average shrinkage by loss of weight in transit being only about 5 per cent. The eggs laid en route are a perquisite of the attendant.

There is greater uniformity and more systematic breeding of poultry in the United States and Canada to-day than anywhere else in the world.

Revolutionary changes have been going on in the poultry industry for ten years. Less and less attention is being given to the purely "fancy" and to the breeding of exhibition fowls, and more and more stress is being laid on their economic value in the production of human food.

The rapid growth of egg-laying competitions has changed public interest. It is less than 20 years since the first egg-laying contest was held in America; at present there are approximately 40 successful competitions in operation, with new ones established every year.

These contests have rendered a great service to the poultry keepers of America, centering interest upon the individual ability of hens to lay eggs. Previously all production records had been considered chiefly in terms of flock average.

Contest experience has shown that successful breeding depends upon isolating the high individual producers and developing from them a strain of birds which breeds true for high egg production.

The efforts of the Federal Extension Service in conducting poultry schools, culling demonstrations, and model farm flocks throughout the rural communities are teaching the lesson that any poultry flock, properly hatched and reared and intelligently fed, can be made to lay during the season of the year when eggs are scarce and hence high.

The farm poultrymen are beginning to apply sound principles in the management of their flocks and are organizing coöperatively to move their graded eggs quickly to the large consuming centers.

THE NATION'S EGG BASKET

The little White Leghorn hens of the Petaluma district, in central California, have become world famous because of the intensive conditions under which they are kept, hundreds of thousands being massed in one small valley; the entire community depends upon commercial egg farming for a livelihood.

Petaluma is known as the "Nation's Egg Basket" because of the vast number of pure white eggs which are produced in that section and shipped throughout the United States.

In 1926 the Leghorn hens of the Petaluma district, an area about 12 miles wide by 30 miles long, produced fifty-one million dozen eggs and shipped more than 1,400 carloads of eggs to eastern markets.

Last year one egg of every 50 laid in the United States came from Petaluma.

An abundance of sunshine and plenty of green food the year round helps to keep the Petaluma hens in excellent health and good laying condition. The eggs come into the big coöperative egg-receiving plants daily, where they are carefully graded for size, color, and condition of shell. All soiled eggs are run through the sand-blast machine for the removal of foreign substances, after which they are carefully packed and sent on their way, by fast freight or express, a distance of 3,000 miles, to our eastern markets.

At the peak of the season one packing plant in Petaluma receives and candles as many as a million eggs a day.

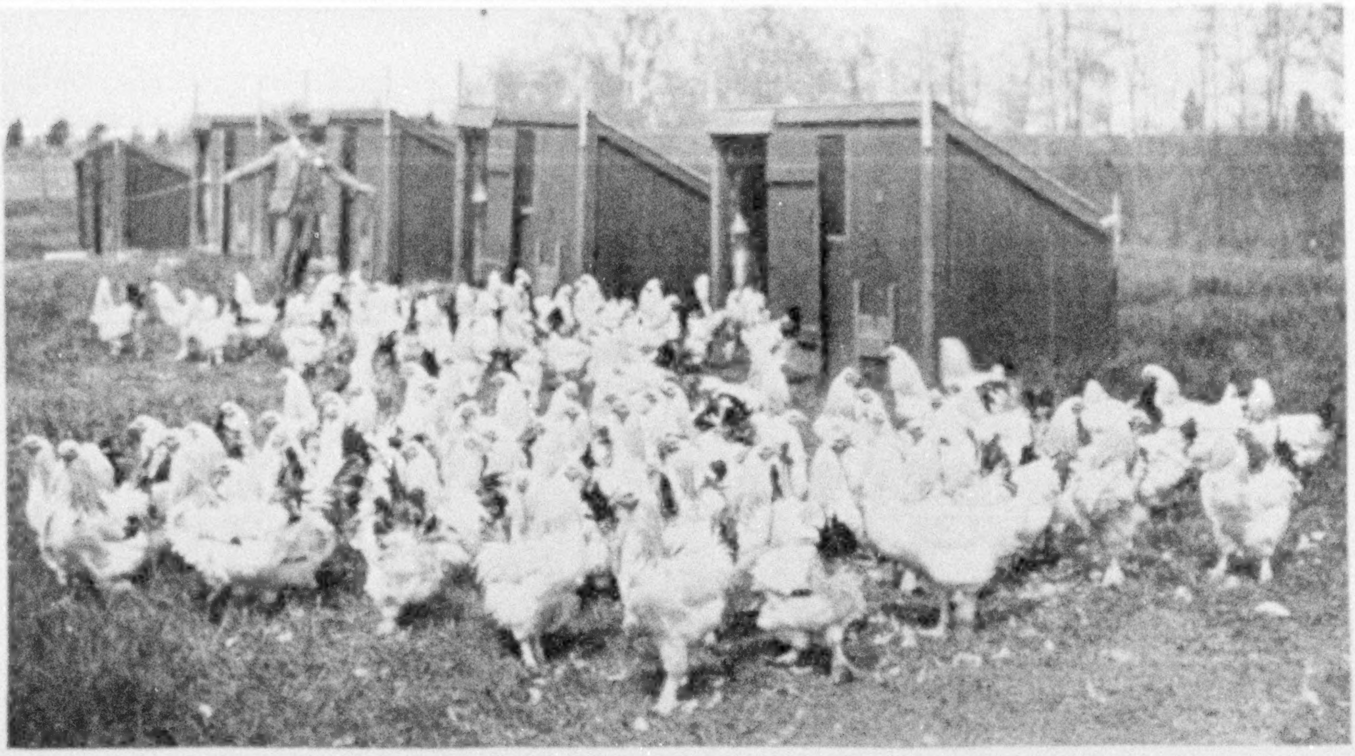
THE RISE OF THE MAMMOTH INCUBATOR

It was not so many years ago that the American hen ruled supreme in the capacity of incubator and brooder, faithfully sitting out the 21 dreary days on the nest, cautiously leading her tender brood of fluffy youngsters through the early stages of their development, and forsaking them for the laying nest after they had reached the age of self-protection and self-support. Times have changed.

The hen is too valuable to-day as an egg machine to allow her to waste weeks and months in hatching eggs and brooding chicks. Then, again, the hen is too fickle, too unstable, too variable in her whims and desires, to entrust to her the hatching of chicks on a large scale. Due to its greater efficiency, the modern incubator has gradually replaced the hen.

The rapid increase in poultry and the growing demand for baby chicks have called for the development of incubators of much greater capacity than formerly.

Credit for making possible our great commercial poultry industry should go in large measure to the modern mammoth incubator, equipped with automatic ventilation and temperature control, with labor-saving devices to eliminate hand-turning



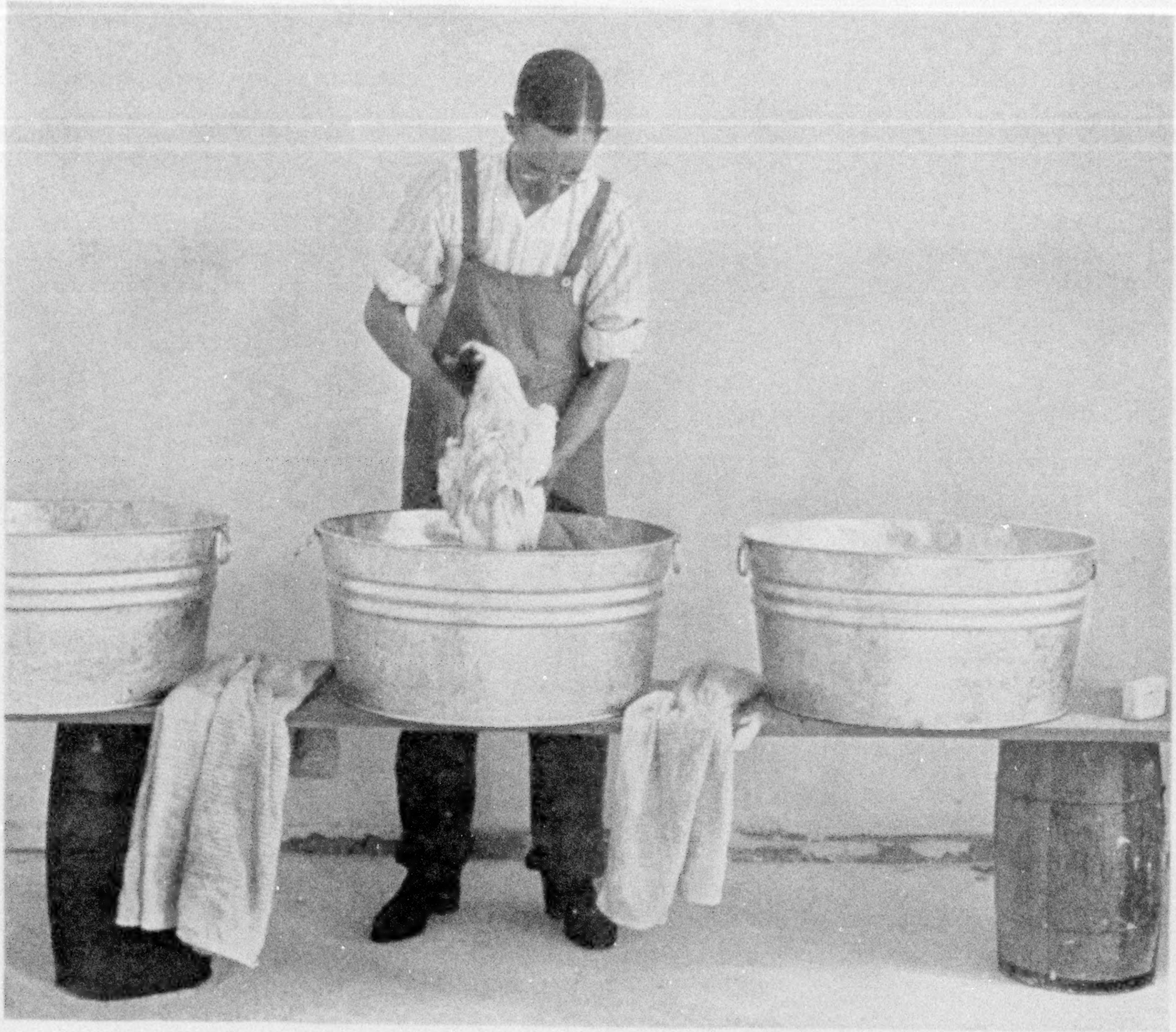
Photograph by Arthur O. Schilling

A FLOCK OF LIGHT BRAHMA CAPONS

The capon is of a docile disposition, and extensive flocks of them may be kept together. They grow large and their bodies develop uniformly, except for the comb and wattles, making them a choice and valuable food product. When prepared for market, certain of their feathers, including those of the neck, lower leg, and last two wing joints, are not removed and serve to distinguish this class of bird. Cockerels are most easily and successfully caponized when from two to four months old.

DEMONSTRATING TO POULTRY CLUB MEMBERS HOW TO CULL A FLOCK

It is essential to successful poultry farming that the owner of a flock should be able to segregate his laying hens from the nonlayers, and thus reduce the cost of maintenance by weeding out the unproductive birds (see text, page 460).



Photograph courtesy U. S. Department of Agriculture

A BATH BEFORE THE SHOW

A product of the Department of Agriculture's poultry experiment station at Beltsville, Maryland, has her plumage laundered prior to a public exhibition. The hen's feathers are thoroughly washed with soap and water in two tubs and then she is rinsed in three other tubs of clear water. A turkish towel is used to dry the plumage before biddy is shipped to the show.

and hand-cooling, with eggs stacked deck upon deck or tier upon tier, efficiently heated with coal, kerosene, or electricity.

Such an apparatus is far removed from the old Egyptian egg ovens, where the eggs were placed in earthen containers on shelves, turned and cooled by hand, and heated by smoldering fires (see page 467). The comparison expresses significantly the progress which the industry has made in mass production.

THE TIDAL WAVE OF BABY CHICKS

Parallel with the development of the mammoth incubator, there has been evolved the colony brooder, heated by coal or kerosene, with a capacity of from 300 to 1,000 chicks under each stove. One operator can effectively manage from 12 to 15 such brooding units and can successfully carry through the brooding period from 10,000 to 15,000 chicks.

The real romance of modern poultry husbandry has been the unprecedented growth in the production and shipment of readymade baby chicks. Hatched in mammoth incubators on breeding farms or at commercial hatcheries, the chicks provide the most economical and convenient method of securing one's foundation stock, of enlarging one's flock, and of providing future generations of layers.

Formerly, hatching eggs were the medium whereby one poultryman purchased stock from another; but some 25 years ago, from the little village of Stock-

Photograph courtesy U. S. Department of Agriculture

POSING AND TRAINING A BIRD FOR THE POULTRY SHOW

Some birds are natural posers, but most of them have to be taught the art of showing themselves to best advantage. This aristocratic White Wyandotte is nearing the end of a course of training that lasts from a week to ten days, during which she is first cooped, then tamed by frequent handling, and finally made to assume various postures to display her best points.

ton, New Jersey, in the Delaware River valley, the first baby chicks were shipped.

For a number of years one poultryman had been supplying chicks in small quantities to his neighbors. The success which they had with this method of acquiring poultry stock soon spread, and little by little orders came for chicks from more distant points, until finally it became impossible to make deliveries in person over the increasing distances from which they were demanded. So it came about that this demand was met by putting the chicks into cotton-lined wooden boxes with holes in the top for ventilation. Twenty-five chicks were placed in a package and shipped by express to their destination. The experiment proved to be a success.

From this small beginning the industry gradually grew, until to-day there are in the United States several thousand hatcheries, equipped to produce baby chicks for shipment and having a capacity of approximately two hundred million eggs at one sitting.

A JOURNEY WITH BABY CHICKS

At the end of the 21st day since the eggs were placed in the incubator the newly hatched chicks are ready to be graded, packed, and shipped. They are taken from the machines and moved to specially constructed, convenient tables in the packing rooms, each chick being handled separately to see that it is a normal, healthy individual. They are packed for shipment in specially constructed baby-chick boxes of from 25 to 100 chicks' capacity.

The boxes are made of corrugated paper

Photograph by Milton A. Ayers

A NEW METHOD OF CLEANING SOILED EGGS

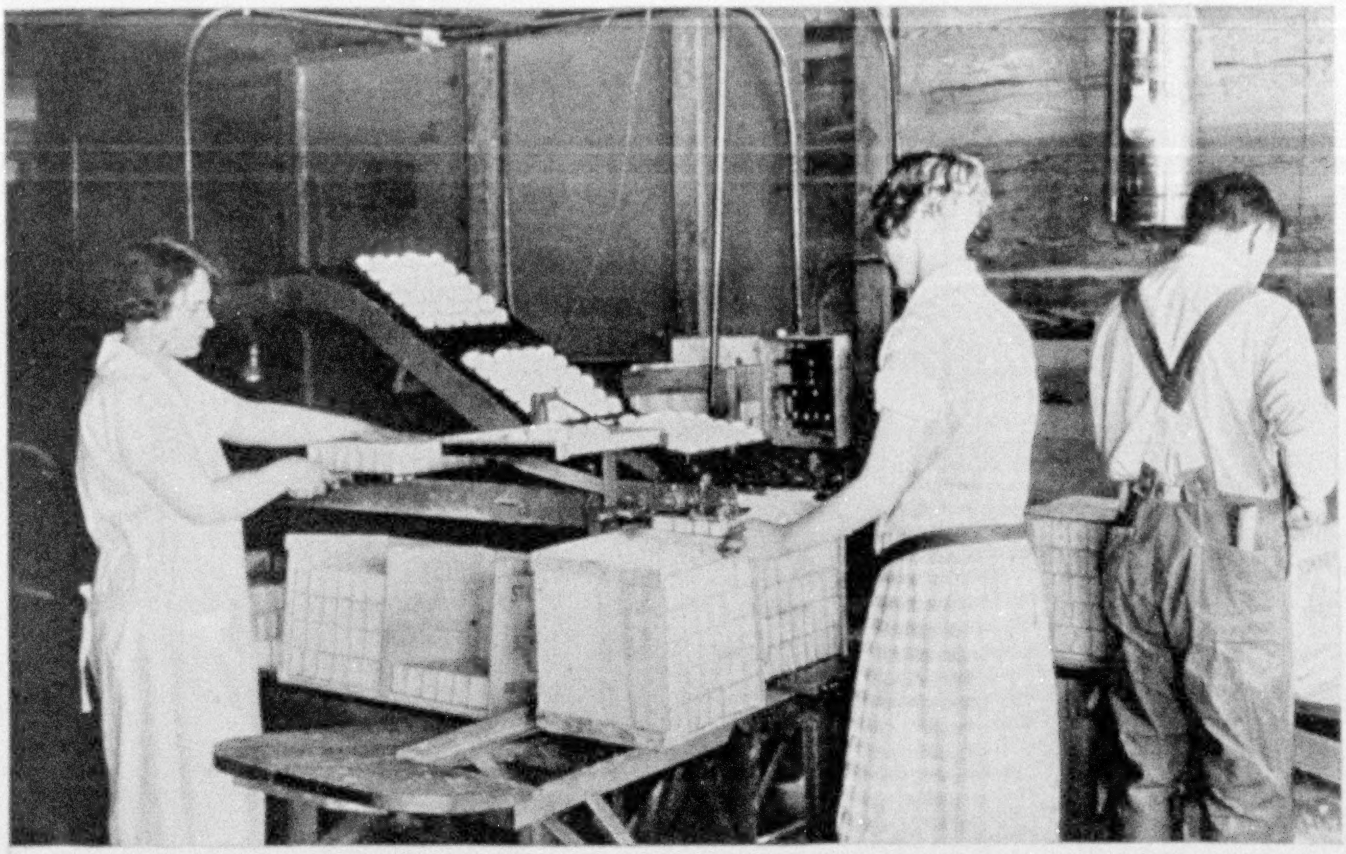
This machine has been developed and installed by a poultry producers' organization of central California at a Petaluma plant. Fine sand is blown on the eggs by compressed air and cuts off any foreign substance which may be on the shell (see, also, text, page 455).

and are ventilated by means of small holes or perforations in sides and top to admit the proper amount of fresh air. Special ventilating strips are attached to the tops of the boxes to keep the chicks from smothering or suffocating when they are piled one on top of the other (page 462).

The bottoms of the boxes contain litter in the form of excelsior, or else they are corrugated to give the chicks a toehold to prevent them from sliding around during the journey. The label is next affixed, the cover attached, and the chicks are ready to go to the post office or to the express office for delivery to the customer's door.

IS SHE LAYING OR LYING?

The poultry departments of our many State agricultural colleges have been responsible during the past quarter of a century for the development of many scientific facts and practices, the practical applications of which have made possible commercial poultry keeping.



Photograph courtesy U. S. Department of Agriculture

PROCESSING EGGS FOR SHIPMENT TO A DISTANT MARKET

Eggs are "processed" by running them through a vat of specially prepared oil, which closes the pores of the shells and tends to keep the contents in good condition while in cold storage.

The ability which the poultryman now possesses to cull his birds on a basis of external character, to eliminate the nonproducers from time to time as they appear in the flock, is an outstanding example (see illustration, page 456).

Weekly culling during the summer and fall brings about a reduction of the feed costs without any decrease in egg yield. Culling is done by observing the condition of certain secondary sex characters and body factors. The laying hen has a bright-red, full comb. When not laying, the comb becomes much smaller, appears shrunken and dry. The heavy-laying hen has a loose, pliable, soft abdomen. In the nonlaying hen the abdomen becomes small, shrunken, and hard.

The hen which is laying and has been laying heavily for some time shows absence of yellow pigments in shanks, beak, ear lobe, and skin, due to the fact that the yellow color which she obtains from her feed has been used up in the production of egg yolks. As soon as she ceases to lay, this color begins to return—first to the ear lobes, then to the beak, then to the shanks—so that there is the definite relation existing between amount of yellow pigment and productive condition.

It is by observing certain of these body characters that the poultryman can tell whether biddy is simply strutting around the pen looking handsome or whether she is really hard at work producing eggs.

TELLING BIDDY'S AGE

It is only in very recent years that a method has been found to tell the age of a bird. Formerly it was largely a case of computing age by the condition of the scales on the shanks, the length of toenails, and the general appearance of head and eyes. Age can now be quite accurately determined by observing the length of the primary flight feathers of the wing.

The pullet possessing a full-grown wing shows the tips of the feathers forming a graceful, symmetrical, even curve. With each succeeding year of age, there comes a definite shortening of certain of the primary flight feathers, following each successive molt or change of plumage. The expert is thus able to determine whether biddy is only a year or two old, and of a profitable laying age, or whether she has passed to that more remote age,

Photograph from Harry R. Lewis

180,000 BABY CHICKS IN THE MAKING

This is one of the five units of a mammoth hatchery located in Petaluma, California. The present capacity is 900,000 eggs, which is being doubled for the next season's operations. The completed plant will be able to turn out 1,800,000 youngsters every three weeks.

when to keep her as an egg-producing machine would be poor business policy.

LIGHTS ARE CHANGING THE PRODUCING CYCLE

Under wild conditions, hens lay but few eggs in the spring of the year to reproduce their kind. With the application of modern principles of nutrition and correct rations properly fed, combined with proper housing and sanitary conditions, it has been possible to lengthen the laying period by inducing the birds to lay earlier in the spring and to continue laying well through the summer and into the fall.

The application of artificial lighting has made it possible to change very materially this natural laying cycle, inducing a substantial production during the fall and winter, when prices are high.

The reason why birds lay few eggs during the short days of winter is that Nature did not intend them to reproduce their kind during this season, and hence their digestive systems, the crop and gizzard, do not have sufficient capacity to hold the required quantities of food to maintain themselves during the long winter nights and at the same time have an excess which they can call upon to produce eggs.

Photograph by Clifton Adams

TAKING DAY-OLD CHICKENS FROM AN INCUBATOR IN A COMMERCIAL HATCHERY AT BRUNSWICK, GEORGIA

At the right is one of the ventilated corrugated cardboard compartment containers in which the baby chicks are safely shipped to distant points (see text, page 458).

The use of lights shortens the long night span and enables the birds to eat more, with the result that they nearly double their fall and winter production and lay from one to two dozen more eggs per year.

ALL COOKERY RESTS ON AN EGG

Eggs have long been rated a superior food because of their palatability, of the ease and rapidity with which they are digested, and their adaptability in cooking. Their high mineral content, the quality of their proteins and fats, and certain growth-promotive properties were early recognized.

"Delivered in the original package" is a virtue and an outstanding advantage which puts eggs in the realm of human food beyond possible adulteration.

Eggs are one of the most important items in the daily diet of Europeans, whose per capita consumption of them is far ahead of that in the United States.

The place which eggs occupy in the European kitchen is admirably expressed by Stacpoole, an old French chef, who says:

"All cookery rests on an egg. The egg is the Atlas that supports the world of gastronomy; the chef is the slave of the egg. What is the masterpiece of French cookery, the dish that outlives all other dishes, the thing that is found on His Majesty's table no less than upon the table of the bourgeoisie—the thing that is as French as a Frenchman, and which expresses the spirit of our people as no other food could express it? The omelette.

Photograph courtesy U. S. Department of Agriculture

A POULTRY CLUB MEMBER WITH A TRAY FULL OF WHITE ROCK BABY CHICKS: VOLUSIA COUNTY, FLORIDA

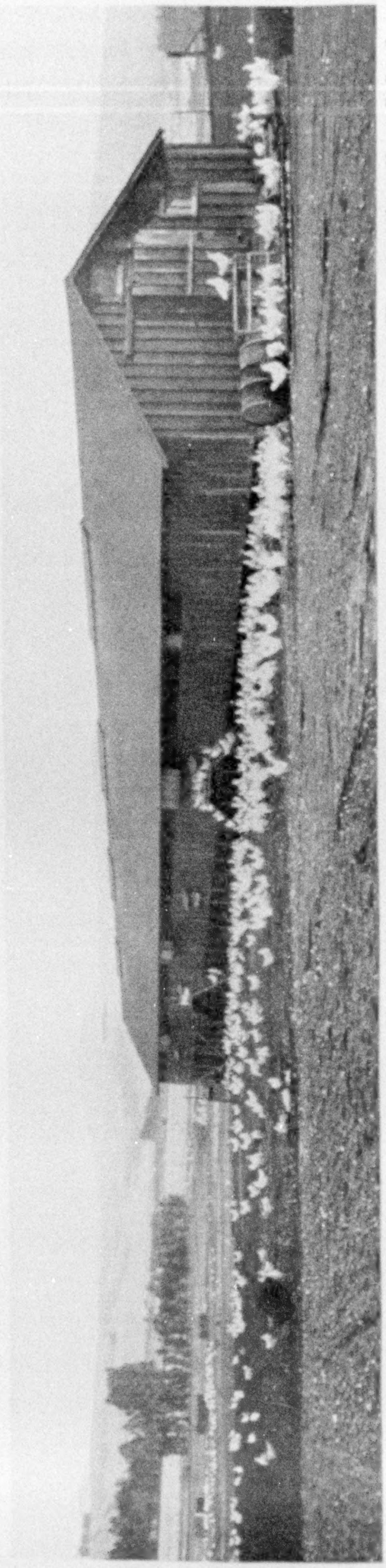
"Could you make an omelette without breaking eggs? Then cast your mind's eye over this extraordinary Monsieur Egg and all his antics and evolutions. Now he permits himself to be boiled plain, and even like that, without frills, naked and in a state of nature, he is excellent. Now he consents to appear in all ways from poached to perdu; now he is the soul of a volau-vent, now of a sauce.

"Not a piecrust fit to eat but stands by virtue of my lord the egg, and should all the hens in the world commit suicide, tomorrow every chef in France worthy of the name would fall on his spit, for fish is but a course in a dinner, whereas the egg is the cement that holds all the castle of cookery together."

We cannot but marvel when we review what has been attained in the development of our domestic species of poultry through scientific mating and rearing.

To-day, through selection and breeding, man has produced veritable egg machines and types that embody practically every shape and conformation of body which might be desired, every conceivable color pattern, together with numerous oddities.

Breeding, feeding, and management have, through succeeding steps, developed individuals which lay more than 300 eggs—in one instance 351—in 365 consecutive days. Whole flocks average 200 eggs or better. An average during the past season of all of the egg-laying con-



Photograph from Harry R. Lewis

A PETALUMA HENHOUSE FOR 2,000 WHITE LEGHORNS

The "Little White Hen" has brought such fame to this California community that a "Petaluma Egg Day" is held every August, when egg-grading and candling contests, parades and floats, bear witness to the Leghorn biddy's place in the hearts of her townspeople.

tests of the United States and Canada showed a yield of 150 to 160 eggs per bird per year (see, also, page 411).

It is the ability of man to breed a bird capable of returning this maximum egg production, and at the same time being possessed of a body well fleshed and of fine quality, which has given domestic fowls the great economic position which they now occupy.

THE HEN IS AN ECONOMICAL PRODUCER OF HUMAN FOOD

Following the World War, the American hen helped to save the day for thousands of farmers in our Middle West States, who, through crop failure, shortage of labor, and low prices, were unable to carry on with the reduced income from their normal crops.

Poultry keeping has been one of the few branches of agriculture which has continued at a profitable level during the reconstruction period, for the hen is one of the most economical producers of human food. No other animal on the farm more efficiently manufactures a finished product for human consumption from raw material.

A little Leghorn weighing around four pounds, if well bred and well managed, will in one year consume from 75 to 80 pounds of feed and produce eggs weighing from 25 to 30 pounds.

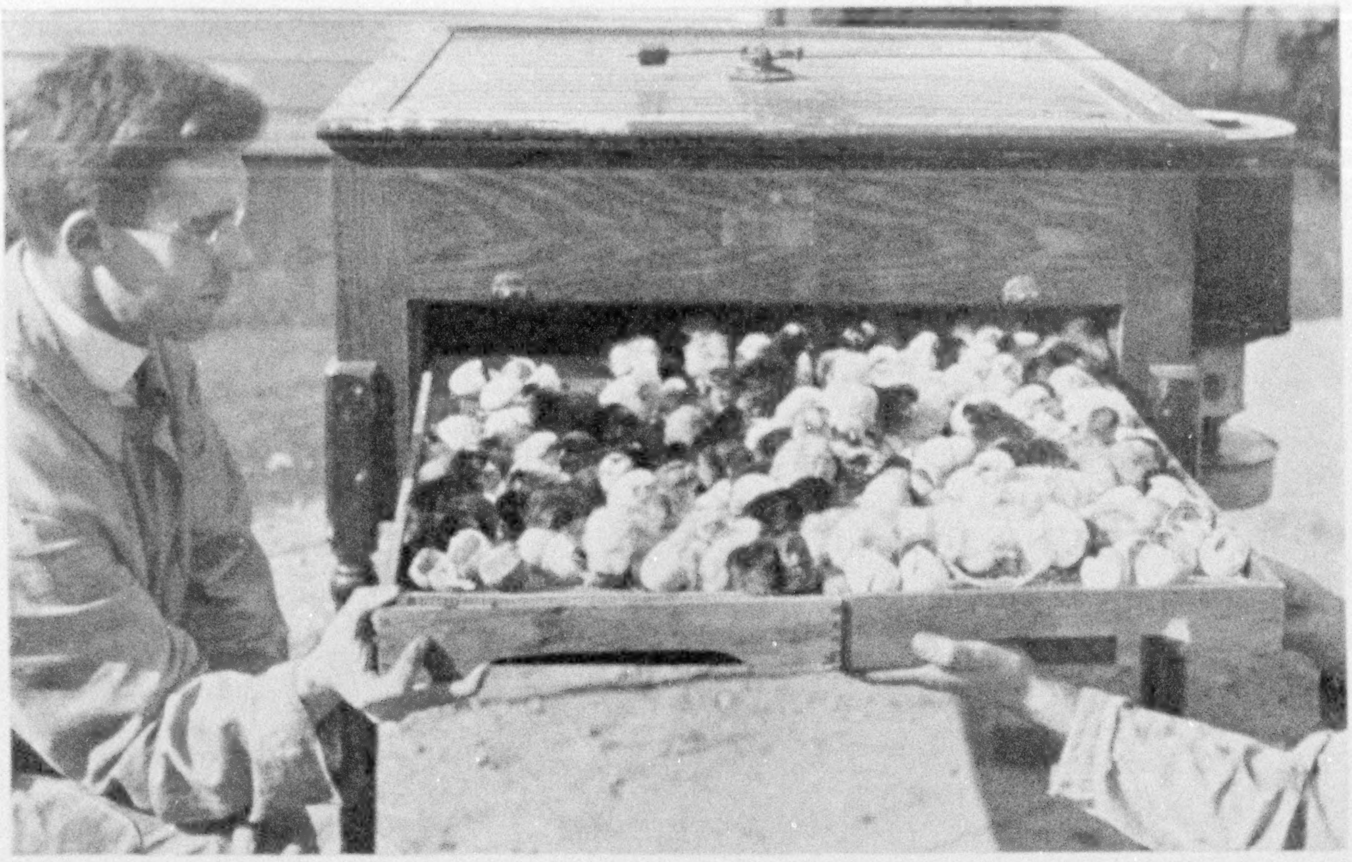
It is the history of all civilized countries that as the population becomes more congested in large urban centers, as the proportion of farmers and producers of foodstuffs decreases, as the land area available for live-stock production diminishes, a nation must look more and more to the small animal unit as a source of food supply. We must of necessity make poultry meat and eggs an ever-increasing part of our daily diet, for the reason that, of all the live-stock industry, poultry husbandry lends itself most readily to intensive methods in limited areas.

But poultry farming is a specialized form of industry. To be successful in this branch of agriculture, one must have intelligence and enterprise and be constantly on the watch against diseases that threaten the flock and be prepared for lower prices whenever the supply of poultry products overtakes the demand.

Photograph by Giroux

ONE OF THE EGG-RECEIVING PLANTS AT PETALUMA, CALIFORNIA

Eggs are delivered here the day they are laid and are carefully graded for size, color, and condition of the shell. Organized effort and standardized product have made California eggs, particularly those from the central California poultry farms, competitively profitable in the eastern centers. In 1926 there were shipped east from California 1,475 carlots of eggs (22,000,000 dozen), an increase of 23 per cent over the eastern carlot shipments of 1925.

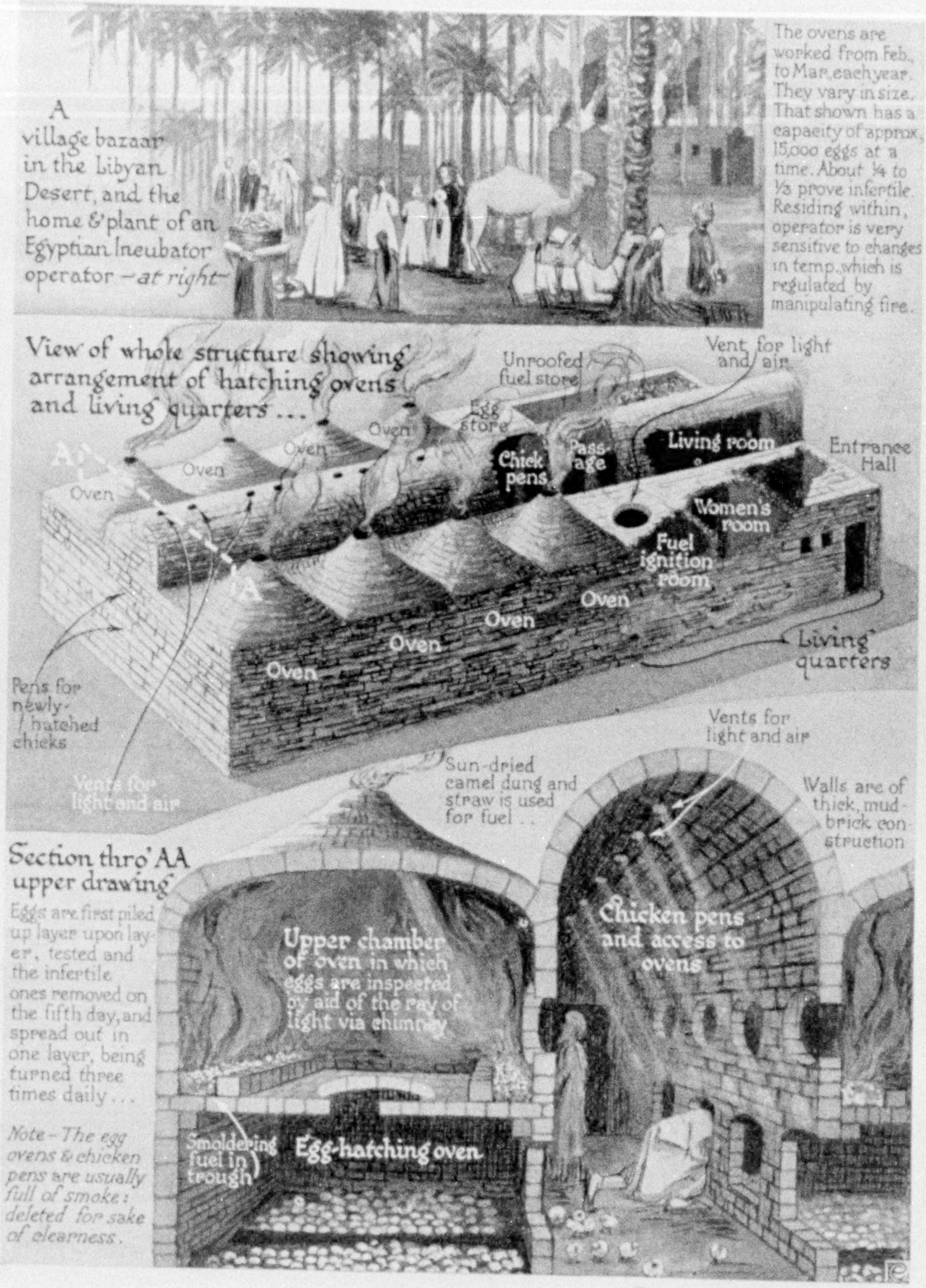


A GOOD HATCH

These purebred chicks are Barred Plymouth Rocks, Rhode Island Reds, and White Wyandottes.

Photographs courtesy U. S. Department of Agriculture

A FLORIDA FARMER AND HIS WIFE SHIPPING 3,500 BABY CHICKS ON ONE ORDER



Drawing by Charles E. Riddiford

A PICTORIAL DIAGRAM OF THE STRANGE AND INGENIOUS ARRANGEMENTS OF THE GREAT EGYPTIAN INCUBATORS

These hatching ovens have been in use in Egypt for many centuries and are much the same to-day as in the time of Moses. There are several hundred such establishments in the Land of the Nile, producing from 15,000,000 to 20,000,000 chicks a season. The operator usually lives in the incubator. He has no thermometer to help him regulate the temperature, but by the "feel" of the air recognizes when the fires need attention.

Photograph by Sidney D. Gamble

CULTIVATING WATER PLANTS IN THE MOAT ALONG THE NORTH WALL OF THE FORBIDDEN CITY (PEKING)

When in bloom, there is no lovelier crop in China than the "Flower of Buddha" (the lotus), whose fleshy roots and seed pods provide delicacies for native epicures.

FARMERS SINCE THE DAYS OF NOAH

China's Remarkable System of Agriculture Has Kept Alive the Densest Population in the World

By Adam Warwick

Author of "The Mongols, People of the Wilderness," and "A Thousand Miles Along the Great Wall of China," in the National Geographic Magazine

WITH no strong central government, but only a vacillating administration over which rival war lords scrap like dogs over a bone; with none of the advantages of scientific bureaus for the study of soils, crops, and weather conditions, China, nevertheless, stands in the world to-day, just as it did, according to Ptolemy, two thousand years ago, as a land of plenty, inhabited by a quarter of the human race.

This enviable position it owes to the note of permanent agriculture struck by its husbandmen when our ancestors were skin-clad nomads. In no other country on earth is it so true that "all trade, as all life, rests upon the farmer's primitive activity."

In China this is all the more significant, for its soil has been cultivated since the days of Noah, and has supported the densest population in the world through millenniums of history longer and more checkered than our own.

It is difficult to determine at exactly what period the Chinese settled in the "Middle Kingdom," but the latest archeological discoveries seem to prove that their first homes on the Great Plain of northern China, near the Yellow River, were made so early that they may, perhaps, be counted as the aborigines of the northwest Chinese provinces.

This, of course, was long before the "black-haired race" knew the use of bronze or iron, and when this people had only rude wooden implements with which to till their fields.

THE MYTHICAL PATRON OF HUSBANDRY

The Chinese themselves attribute to the Emperor Shen Nung, who is supposed to have lived about 2700 B. C., the arts of husbandry and the invention of the plow. This mythical personage still remains the patron of farmers and was, until the abolition of the monarchy, in 1911, worshiped yearly at the season of the spring sowing by the Emperor in Peking, and by his delegates in every province.

To this sovereign are also credited the original arrangements with regard to landed property in China. As a matter of fact, it seems probable that the early settlers separated into clans or family groups, that these clans came naturally to vest authority in elders, and that the latter in the course of ages became the rulers and, finally, the owners of the land.

THE YELLOW RIVER IS "CHINA'S SORROW"

Some time after the Chinese had settled in their new homes, one of those great inundations for which the Yellow River, known as "China's Sorrow," is famous, obliged the people to flee from their flooded fields and take refuge in the hills.

But the emergency provided the man who was to cope with it, the man whose name has been sung throughout the ages, the Great Yü.

An ancient document called the "Tribute of Yü" describes his labors in remedying the disasters of the inundation, and the reapportionment of land.

Passing to a later stage of history, we come to the sweeping reforms of that great figure, Ch'in Shih Huang Ti, builder of the Great Wall* and one of the most remarkable men in Chinese history, who, in 220 B. C., did away entirely with the principle of community ownership and substituted that of private property.

The latter persists in China to-day, though the older system, temporarily reestablished at various times, died hard. In fact, lingering vestiges of it are still traceable.

* See "A Thousand Miles Along the Great Wall of China," by Adam Warwick, in the National Geographic Magazine for February, 1923.

Photograph from Alice G. Brock

FARM HOMES MADE OF MUD BRICKS DRIED IN THE SUN, WITH ROOFS OF STRAW THATCH

At the left are heaps of firewood. China has few trees except those growing about the temples and shrines, for its forests were used for fuel centuries ago. The round trays on the hill, containing grain and mustard seed drying in the sun, are made of woven bamboo.

Photograph by Branson De Cou

PLOWING RICE FIELDS NEAR KOWLOON

To prepare the ground for his seedlings (see illustration, page 472), the Chinese husbandman churns the soil with a plow until it becomes a mixture of mud and manure about the consistency of porridge (see text, page 484).

A CHINESE TRAVELER IN HIS LITTER PRECARIOUSLY CROSSES A NATIVE BRIDGE

Photograph by Charles H. Kragh

ENGAGED IN THE BACK-BREAKING TASK OF TRANSPLANTING RICE

The most delicate part of the cultivation of rice is the transplanting of the seedlings when they are about twelve inches high. The plants are gathered in bunches of four or five each and with a single adroit movement of the hand are thrust into the mud (see text, page 484).

Photograph by J. T. McGarvey

CHINESE GIRLS CHASING GRASSHOPPERS FROM THE FAMILY FARM

Photograph by Adam Warwick

PLAYING NURSE

The farmer's grandchildren begin to take their share of the daily tasks almost as soon as they can toddle, or play nursemaid to still smaller brothers and sisters. There are no idlers in the households of the rural Chinese.

Photograph from Joseph Beech

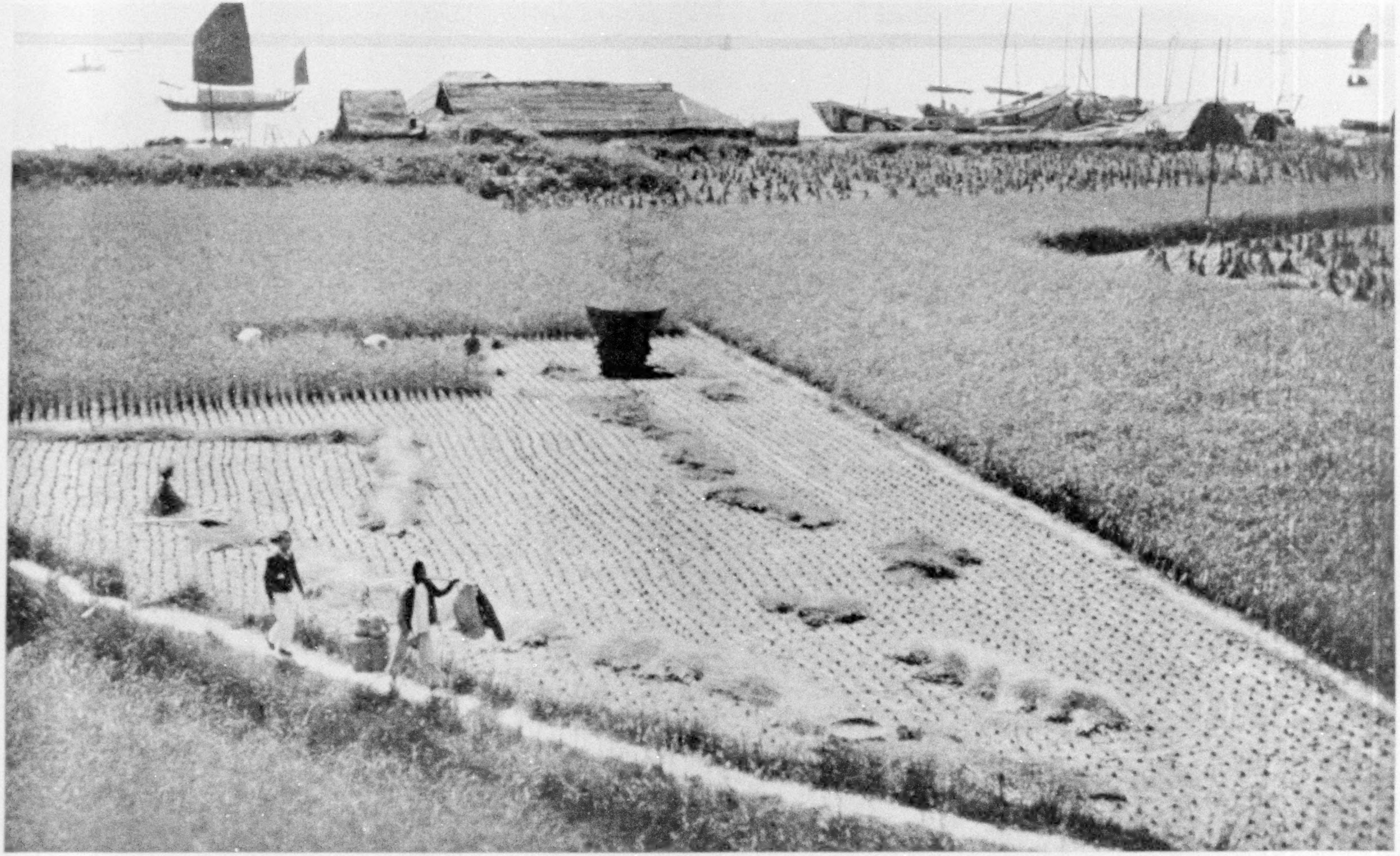
THE HOME OF A RICH SZECHWAN FARMER

Many wealthy farmers are to be found on the fertile Chengtu Plain in central China, north of the Yangtze River. They till their estates with the aid of sons and grandsons or with hired help. Note the beans growing on the paddy-field bank in the foreground. Not an inch of arable ground is wasted.

Photograph by Joseph F. Rock

TIRELESS FARMERS HAVE LABORED SKILLFULLY FOR GENERATIONS TO CONSTRUCT THESE WONDERFUL TERRACED RICE FIELDS

Equipped only with hand implements, the Chinese have built these paddy fields in Yünnan Province, bit by bit and year by year adding a few more feet or inches to the area of cultivatable soil on the mountain side. Rice is the chief staple food for more than one-half of the human race.



Photograph from Alice Tisdale

MEN AND BOYS, ARMED WITH SHORT SICKLES, HARVEST THEIR RICE CROP

At the approach of harvest, sisters, cousins and aunts, nephews and grandchildren are mobilized in full strength. First there is the reaping to be done—a slow business with old-fashioned sickles. Then the crops must be hauled by cart or carried in baskets on bent backs to the threshing floor, one or more of which are to be found in every village (see pages 479 and 480).

The family, not the individual, remains the unit, as it was in those far-off ages, and no land transfer can be made without the holding of a family council.

Moreover, the right of pasturage in certain mountainous districts is still claimed by several villages in common—a striking example of the older and more primitive form of civilization.

ONE ACRE SUPPORTS TWO CHINESE

Despite the density of the rural population in China, where, in some provinces, there are sections having 3,800 people, 384 donkeys, and 384 pigs to the square mile, or 240 people, 24 donkeys, and 24 pigs to one of our 40-acre farms, there remain vast areas of uncultivated, because uncultivatable, mountain land in China proper.

The Chinese are able to live on their small holdings only by reason of favorable climatic conditions, the fertility of the soil, effective agricultural methods, extreme personal economy, and the small taxes taken by the state.

That wise old Emperor K'ang Hsi, in honor of the fifty years' jubilee of his reign, in 1711 A. D., issued a decree saying that "as the population of the Empire increased, the amount of arable land did not increase," and that the land tax should, therefore, be estimated on the census of that year and should never be increased. It never was.

In 1753 the total revenue from the land tax stood at taels 29,000,000, or about $22,000,000 in gold, and in 1900 taels 27,000,000 were collected from the same source, the decrease being accounted for by the calamities of the preceding years.

NOT AN INCH OF SOIL IS WASTED

If the week-end traveler in China gets the idea from looking out of train windows that he is in a land of continuous farms and vegetable gardens, his impressions are largely due to the fact that wherever cultivation *is* possible it is highly intensive, and that not an inch which might be used is wasted.

Nor is any toil or trouble considered too great that brings a return in foodstuffs, as may be judged by such expedients as truck gardens planted on rafts covered with soil and anchored in the midst of rivers; as fields actually reclaimed from the ocean beach, where hardy maize dips its roots almost in the sea; and as patches of steep hillslope leveled with enormous labor and sometimes built up on three sides with stone walls (see page 475).

Truly, if China's precious land supports a population greater per square mile than that, not only of the United States, but of most of the densely populated countries of Europe, it is only because the yields of Chinese agriculture are higher than elsewhere, due to the genius of her husbandmen as shown in their "infinite capacity for taking pains."

The working of a Chinese farm depends entirely upon personal human labor and generally upon that of one family.

Tradition, custom, and economic conditions do not encourage the investment of capital for large-scale farming.

THE GREATEST TRIUMPH OF THE CHINESE FARMER

The fields of China, as already pointed out, have been cultivated for several thousand years by the same methods without overtaxing their resources. This remarkable fact is due to certain peculiarities of the soil itself, plus very careful working, guided by the experience of centuries.

"When we reflect upon the depleted fertility of our own older farm lands," as Professor F. H. King remarks, "comparatively few of which have seen a century's service, and upon the enormous quantity of mineral fertilizers which are being annually applied to them in order to secure paying yields, we cannot but admire how the Chinese have managed to maintain so well the first condition of farming—soil fertility—and to solve the problem of soil exhaustion, one of the most fundamental, difficult, and vital problems of all civilized people." *

Perhaps the greatest agricultural triumph of the Chinese farmer is his knowledge and use of natural fertilizers. He cannot afford—nor, in many places, could he obtain them, even were he able to pay the price—expensive phosphates and nitrates commercially prepared. The chief

* See, also, "The Wonderful Canals of China," by F. H. King, in the National Geographic Magazine for October, 1912.

Photograph by Maynard Owen Williams

A FLOCK FINDS PASTURAGE IN AN OLD GRAVEYARD OF THE YANGTZE VALLEY

Though well-to-do folk in China have elaborate tombs for their dead, humbler graves are simply mounds of earth. The latter are not altogether unproductive, since they are generally overgrown with herbage used as pasture for geese, sheep, goats, or cattle. Still, they often break up fields in a most inconvenient way, necessitating extra labor in plowing.

aids he can enlist in his everlasting battle against soil exhaustion are human and animal manure.

Indeed, the need of these is so great that poetic inscriptions on special pavilions in remote localities invite the passer-by to stop and contribute to the scanty resources of the neighborhood.

Statistics show that "the international concessions of the city of Shanghai sold to one Chinese contractor for $31,000 gold the privilege of collecting 78,000 tons of waste from the local drains and of removing it to the country for sale to farmers." A flotilla of canal boats is engaged throughout the year in this service.

In the West, and more especially in the United States, "man," to quote Professor King again, "is the most extravagant accelerator of waste the world has ever endured. His withering blight has fallen upon every living thing within his reach, himself not excepted, and his besom of destruction in the uncontrolled hands of a generation has swept into the sea soil fertility which only centuries of life could accumulate. . . .

"On the basis of the data of Wolff, Kellner, and of Carpenter, or of Hall, the people of the United States and of Europe are (yearly) pouring into the sea, lakes, and rivers, and into the underground waters, from 5,794,300 to 12,000,000 pounds of nitrogen, 1,881,900 to 4,151,000 pounds of potassium, and 777,200 to 3,057,600 pounds of phosphorus per million of adult population, and this waste we esteem one of the great achievements of our civilization. Whereas in China all this is saved and returned to the fields."

WASTE AND REFUSE ARE "FED TO THE CROPS"

Near every farmhouse, and often in a proximity to the living rooms that shocks our olfactory nerves, stand pottery jars for storing this precious fertilizer, later to be diluted with water before it is "fed to the crops."

Household waste, stubble, roughage

Photograph by Hartung, Peking

THRESHERS AT WORK IN CHIHLI PROVINCE

Here the grain is separated from the straw with a rude "guillotine" knife, spread out to dry, and turned over and over with the ever-useful wooden-pronged forks that serve a dozen purposes (see, also, page 480).

Photograph by Charles H. Kragh

WOMEN GRINDING WHEAT TO REMOVE THE HUSK

After the grain is winnowed by the simple process of throwing it into the air or pouring it onto the ground from a raised platform in front of a matting "sail," it is spread out in the sun for a final drying and is then ground in primitive mills (see pages 482 and 485) that produce a coarse flour—a fact that explains why considerable quantities of fine American flour are imported into China.

A BULLOCK PROCESSION THRESHES WHEAT

Following the process shown in the upper illustration on page 479, the grain is either beaten by hand, as in the case of rice, against a bamboo screen or, in the case of millet or rape, trodden by human feet or rolled by small stone rollers, drawn by donkeys or bullocks, until the grain is all detached from the smaller stems. The straw is gathered into ricks.

from the fields, ashes, and the droppings from passing caravans, carefully collected by small boys with baskets and scoops, are all made into compost by being mixed with earth.

The piles of soil which cumber every narrow village street are used for this purpose, while passers-by obligingly make a detour to leave room for the laborers who mix the earth and refuse.

Wherever available, canal mud is generously applied as a dressing to the fields, and in some places as much as 80 tons per acre are laboriously dipped up from barges. The reward in fertilization, however, is very great, as this mud is highly charged with organic matter and lime from the small snail shells that frequently give the appearance of a pebble-strewn beach to a newly plowed field.

This rich mud is, unfortunately, available only in the southern, or "wet," farming districts.

"WET FARMING" AND "DRY FARMING"

Agriculture in China falls naturally into two great divisions—the "wet farming" of the canal, or rice-growing, country, and the "dry farming" of the northern plains, or grain-growing section.

It is significant, however, that, though climatic conditions, soils, and crops differ, the farmers all over China use practically the same primitive methods of cultivation, sowing and reaping with the same agricultural implements. The latter are few and cheap; simple, yet well adapted to their uses; light in weight, yet easily repaired at home—essential features in the eighteen provinces.

Spades, rakes, and wooden hoes are largely used for soft ground, and broad-bladed iron hoes, "which cut shallow and permit the soil to drop practically upon the place from which it was loosened, for working between rows of grain after rain."

As the blades of all these tools are detachable, it is not unusual to see a farmer going out to his day's work in the fields with one long wooden shank over his shoulder and a handful of blades to be fitted on it as circumstances require.

Stone rollers, pulled by man-power, to flatten the earth between furrows; harrows drawn by mules or donkeys, and iron-shod wooden plows, that penetrate the earth to a depth of five inches and cost less than $5 gold, are in general use.

Such plows, efficient yet light, and small enough to be carried home by the farmer himself over his shoulder and stored in an outhouse or even in a corner of the family living room, are drawn by various animals—by water buffaloes (akin to the carabao of the Philippines) in south China; by small oxen, by mixed teams of ponies, donkeys, bullocks, and mules in the north—sometimes, in poor districts, by a single donkey or by the men of the household.

THE FARMER AND HIS FAMILY WORK THE FIELDS UNAIDED

Such plowing is indeed shallow compared to ours, done by powerful motor-driven machinery; but we must not conclude from appearances that Chinese farmers, as has so often been erroneously stated, "barely scratch the surface of their fields." Their tools may be crude, but their soils are worked carefully and often, with great labor and skill, sometimes against heavy odds.

Indeed, the outstanding feature of Chinese agriculture is the amount of human labor expended upon it. Fields are prepared by hand, weeded by hand, often watered by hand. Seeds are sown and crops fertilized and reaped by hand.

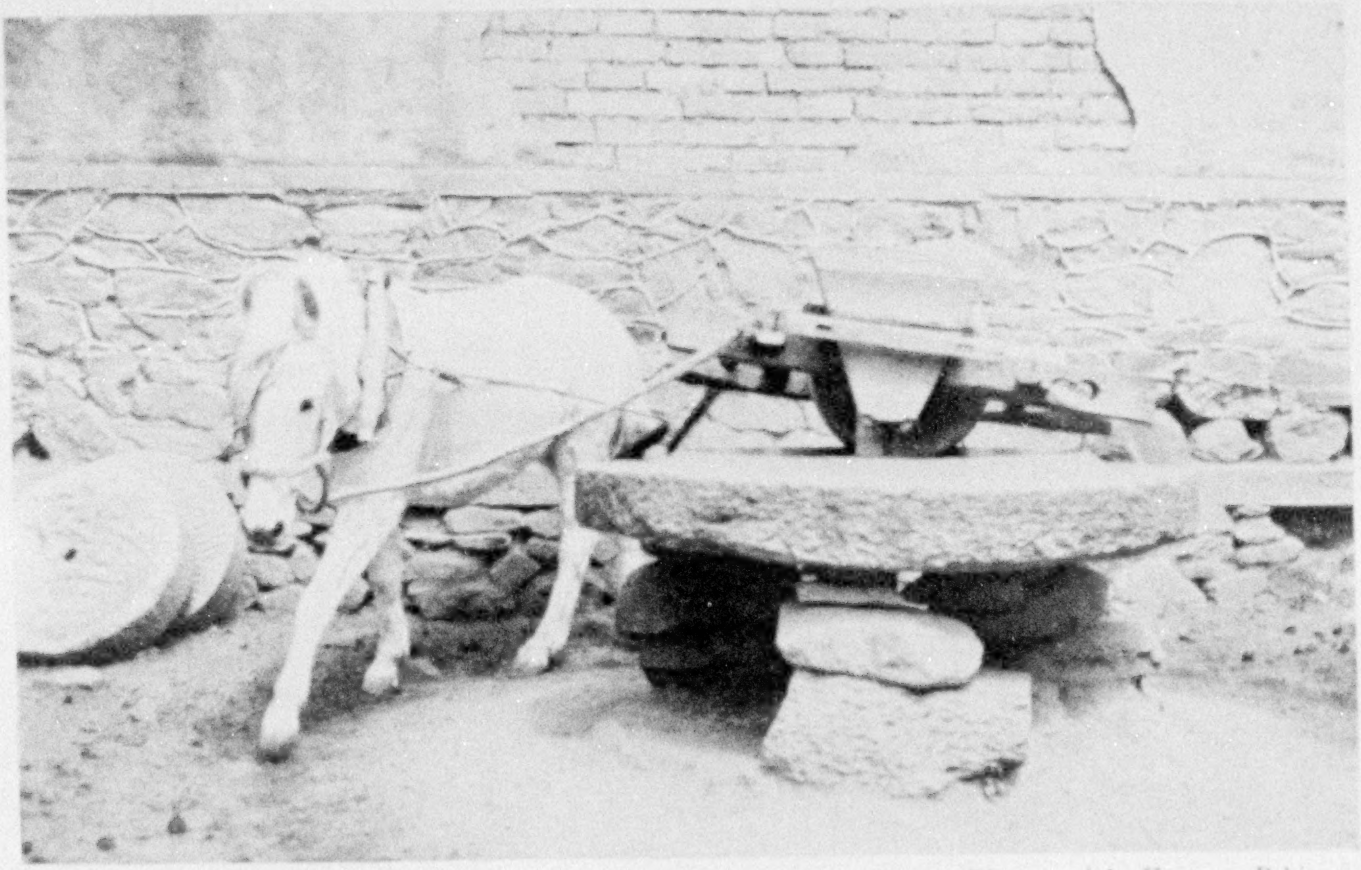
From dawn to dusk the farmer's family and animals work on the land, often cooking the midday meal—a mess of millet—on an improvised mud stove and using as a manger for their beasts the cart that has carried out compost and will bring home the ripe crop.

Though groups of villagers sometimes work together, hired help is rare except on the larger farms in Manchuria, where coolies from the densely populated portions of Shantung sometimes go for the harvest season. Consequently, the Chinese farmer and his family work their own lands unaided. This means, of course, phenomenal energy on the part of all.

Every member of the household is useful, according to his or her strength, from the youngest to the oldest. The menfolk plow and sow the seed, the wives help with the weeding, the old and infirm stand guard in the crop-watcher's hut to give

Photograph by Adam Warwick

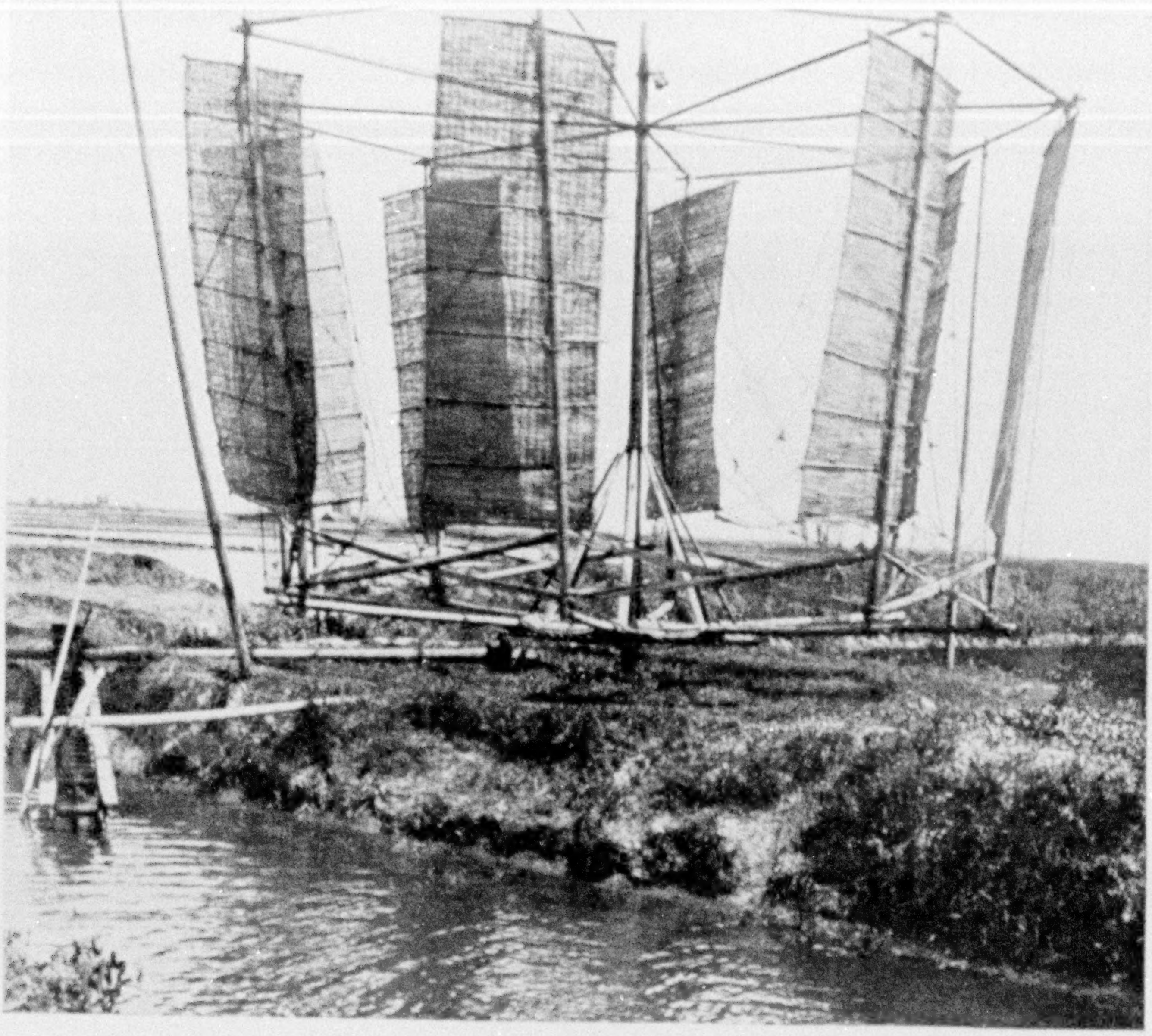
TRANSPORTING A GRANITE MILLSTONE TO CHIHLI PROVINCE FROM A DISTANT MOUNTAIN QUARRY



Photograph by Hartung, Peking

WITH ONE EYE COVERED LEST HE GROW DIZZY, THE PONY MAKES HIS CEASELESS ROUND GRINDING GRAIN

The flour mills of the southern provinces are run by water power, but in the north, a characteristic sound in farming villages is the creak of the upper and the nether millstones, as they are slowly turned by the women, by a donkey or shaggy pony.



HARNESSING THE WINDS TO AID THE CHINESE FARMER

In south China, where streams and canals abound, water wheels and windmills such as these are numerous, but wherever ditches or ponds exist various mechanical appliances of a primitive type are used for pumping water to level fields (see pages 485 and 486).

warning against petty thieves who might try to steal the ripening grain.

EVERY SPEAR OF RICE IS TRANSPLANTED BY HAND

Nowhere is the industry of the Chinese farmer better illustrated than in the southern, or rice-growing, provinces, where climatic conditions permit of several (sometimes as many as four) crops a year from the same soil.

Since rice is not only the staple, but the favorite food of the people, from the highest to the lowest, it is not surprising that paddy fields form an eighth of the total area of cultivated land in China.

Yet, notwithstanding the enormous acreage of rice planted each year since 3000 B. C., this crop is all set out in clumps and every spear transplanted by hand. The double operation allows the farmers to economize their land and save in many ways except in labor, the one thing they have in superabundance.

"By thoroughly preparing the seed bed, fertilizing highly and giving the most careful attention both before and after planting, the industrious 'Sons of Han' are able to grow on one acre, during 30 to 50 days, enough plants to occupy ten acres, and in the meantime crops are maturing on the other nine acres, being harvested, and the fields fitted to receive the rice when it is ready for transplanting."

Thus, in effect, this interval of time is added to the growing season.

POCKET-SIZED RICE FIELDS

Each rice field is surrounded by its own little dam a foot high. Some of these

Photograph by Maynard Owen Williams

THE SZECHWAN PLANTER EMPLOYS A GIANT BAMBOO WATER WHEEL IN IRRIGATING HIS FIELD

One of the most ancient irrigation systems in the world is to be found on the Chengtu Plain, in Szechwan Province. (See, also, "The Eden of the Flowery Republic," in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1920.)

fields are no larger than a small room, and Professor Edward A. Ross says he saw "some in the interior of China no larger than a dining table, and even one bearing its crop, surrounded by its rim and holding water, yet scarcely larger than a good-sized napkin."

In a corner of his field the thrifty husbandman prepares his nursery for raising seedlings sufficient to plant his whole land. The soil is churned up by the plow until it becomes a mixture of wet mud and manure about the consistency of porridge (see page 471). Seed, which are then thickly sown, sprout in a very few days, turning the nursery into a carpet of young green plants.

The rest of the land has, meanwhile, been prepared for their reception, embankments made water-tight, etc.

Enough water is admitted, by artificial means if the rainfall cannot be depended upon, to a depth of several inches, a rake-harrow used to remove grass and weeds uprooted by the plow, and the soil again worked over to a well-smoothed surface.

SKILL IS REQUIRED TO TRANSPLANT RICE SEEDLINGS

The most delicate part of rice cultivation is the transplanting of the seedlings when they are about twelve inches high and have gained sufficient strength to take advantage of the nourishment prepared for them (see page 472).

Some hundreds of plants are grasped about the middle with both hands and drawn gently from the mud. Each bundle is then swung heavily in the air and brought down against the embankment or even the raised foot of the planter, to shake off the earth; then laid upon the ground, where it is shaken into shape and tied with a wisp of grass.

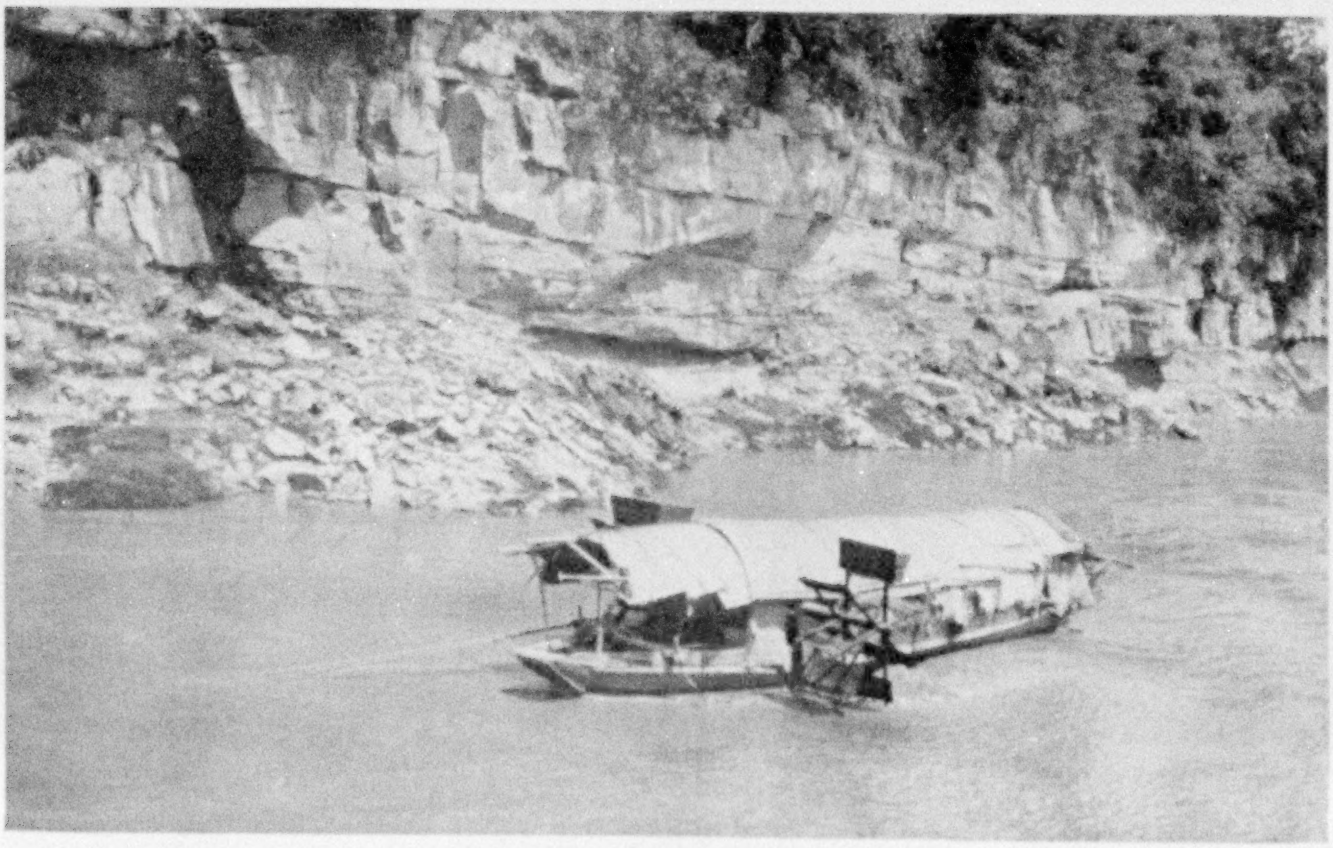
If prepared by a skillful hand, these bundles show scarcely a seedling crushed or damaged.

For replanting each bundle is untied as required, the seedlings deftly separated into bunches of four or five and plunged with a single adroit movement of the hand into the mud at regular intervals.

Photograph by Charles H. Kragh

PUMPING WATER TO THIRSTY FIELDS (SEE, ALSO, PAGE 486)

The most usual form of irrigation pump is a simple but efficient machine worked by foot power, like a treadmill. It consists of an open box trough in which travels a wooden chain carrying a series of loosely fitted boards that raise the water from the canal.



Photograph by C. A. Jones

A YANGTZE RIVER BOAT BECOMES A FLOUR MILL

The craft is anchored in midstream, where the current is swift, and the mill can operate continuously, whether the stage of the river is high or low. This practical idea has been borrowed from the Chinese by European peoples, and many such boat-mills may be seen on the Danube between Vienna and Budapest.

Photograph by Maynard Owen Williams

THE YOUNGER GENERATION IRRIGATES A FUKIEN FARMER'S FIELD BY TREADING THE PUMP (SEE, ALSO, PAGE 485)

Every stream and spring is utilized to the utmost, and the tillers of the soil in some parts of China hold a yearly thanksgiving service to the Dragon of the Water in their neighborhood. No large-scale attempts are made to irrigate the land in the dry regions, despite the fact that the Chinese have come to understand and appreciate the value of water in crop production better than any other nation. While the government is unwilling nowadays to undertake important irrigation projects in the provinces where they are most needed, the people themselves show great ingenuity in utilizing such water as is available.

All that is required now is a certain amount of weeding and an occasional inspection of the dams. When the crop begins to ripen, birds must be frightened away until the time of harvest.

BANDITS FLOURISH IN MILLET SEASON

Dwellers in a land where Drought, with its dreadful shadow, Famine, is ever at their heels, the "dry farmers" of northern China (see, also, text, page 481), whose constant preoccupation is the conservation of every drop of moisture, raise millets, which rank well with wheat in nutritive power, as their staple crops.

The Chinese millets are of several kinds, the most important and useful being the large millet (sorghum, or kaoliang), a magnificent plant indigenous to Manchuria and imported into China about the third century A. D.

Apart from its generous yield of grain, which amounts to nearly 6,000 pounds per acre, its food value is so high that a laborer requires only four pounds per day and an ordinary person only half this amount.

But this valuable and economical crop nourishes also horses, mules, cattle, dogs, cats, and all other domestic animals. It is further used for making vinegar and wine, a disciple of Bacchus under the Mongol dynasty inventing the rude home-brew, practically pure grain alcohol, which is drunk to-day in the villages.

Yet, despite the fact that stills operate everywhere and a clay jar of wine may be had for a few coppers, such are the moderation and good sense of the Chinese people that drunkenness is very rare.

When the heavy heads of grain are cut, the kaoliang, like the bamboo in southern China, still has manifold uses. Mattings and wrappings are made from the leaves; the bare stems serve for thatch, fences, ceilings, even for walls when plastered over with mud, and for fuel; and as a wind screen for other crops, this giant plant, often growing to a height of twelve feet, is particularly effective.

Indeed, the Chinese say that it has but one fault: when at its full height it forms an excellent screen even for mounted bandits, and the kaoliang season in Manchuria is known as the "bandit season."

In some districts where this large millet is cultivated, the lower leaves are stripped off at certain times to allow the stalks to "breathe," in order that the grain may ripen better.

"Where this practice prevails," says Arthur Smith, "the day on which the stripping of the leaves shall begin is sometimes strictly regulated by agreement, and no person, rich or poor, is allowed to anticipate the day. But on that day anyone is at liberty to strip leaves from the fields of anyone else, provided he does not go above the stipulated height on each plant. The day before the stripping is to begin, warning is sounded by the village gong, and the next day all the people make this their main business."

THE LOESS IS CHINA'S MOST FERTILE SOIL

By way of compensation for their insufficient water supply, the farmers of north China work the most naturally fertile soil within the borders of their vast country—the so-called yellow earth, or *loess*, which covers the northern provinces over an area larger than the old German Empire.

This loam is a peculiarly porous soil with a foundation of vegetable remains, built up by the winds from the Mongolian plateau sometimes to a thickness of more than a thousand feet. Its peculiar yellow color, which accounts for the wonderful desert light effects in north China, is due to traces of iron.

Though, at first sight, loess appears dry and barren, it is really more fertile than the rich black earth of the alluvial plains. It has the peculiar quality, provided it is not trampled down and the cells broken, of draining moisture through these loose cells, and also of absorbing from the atmosphere those elements which are needed to make crops grow.

It is, moreover, economical to work, requiring no artificial fertilizer, even after four thousand years of cultivation, except a thin dressing of loess from a lower level, provided, of course, there is a sufficient water supply; for the very nature of this porous earth makes it unable to hold moisture any length of time, and the effects of drought upon it are therefore exceedingly serious.

Several varieties of beans are grown in the north, including the famous soy bean,

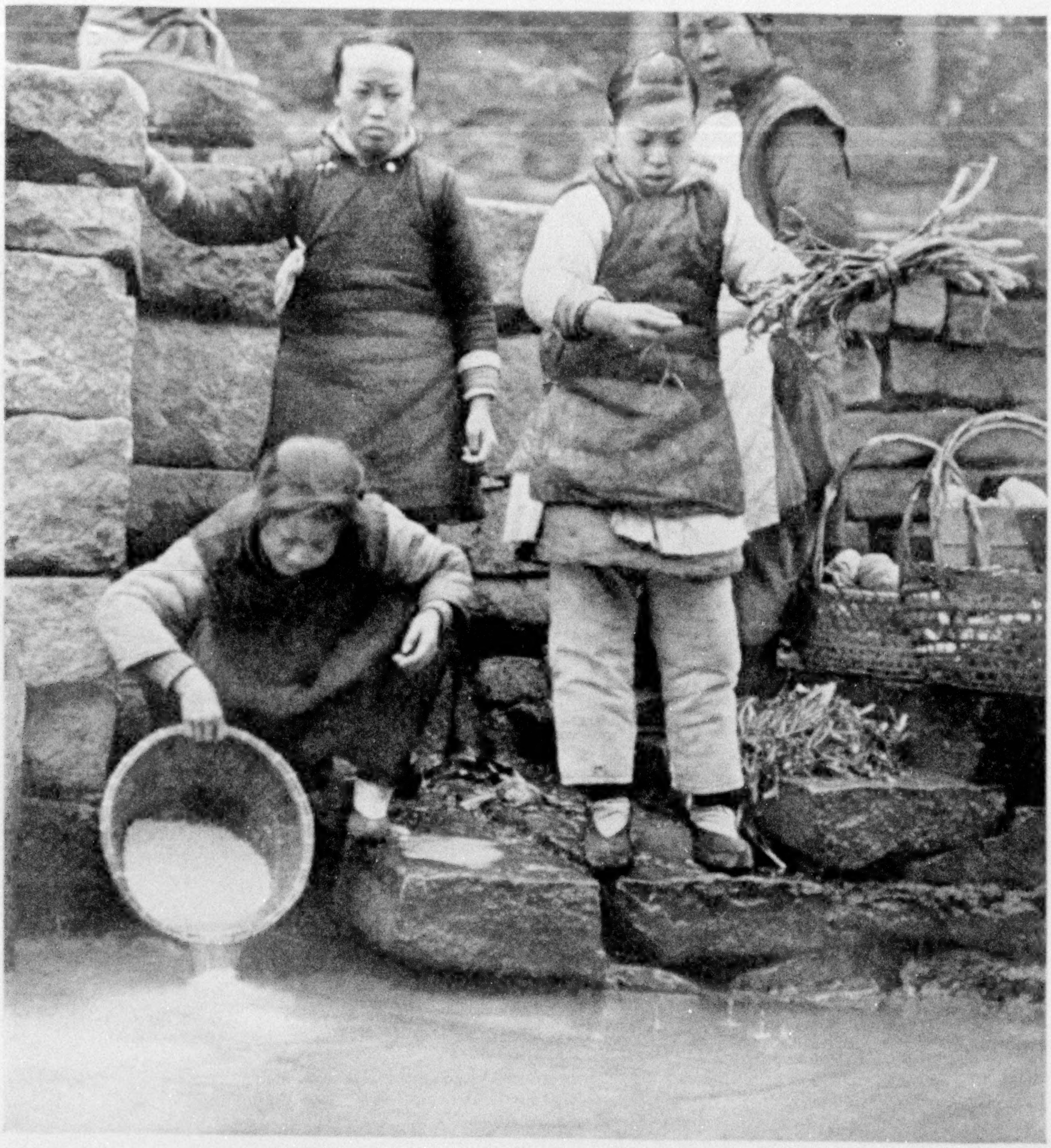
INSPECTING A FIELD OF INDIAN CORN IN SZECHWAN

Although a conservative, the Chinese farmer has adopted many food plants from abroad, including Indian corn, imported into the country by the Portuguese via America in the sixteenth century.

Photographs by Maynard Owen Williams

TAKING A WHEELBARROW LOAD OF COTTON INTO TSINAN

After tea and silk, cotton is the most important commercial crop raised in China (see text, page 492).



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WASHING VEGETABLES IN A CANAL AT SOOCHOW

This large inland city of China, a short distance west of Shanghai, is so thoroughly canalled that it suggests an oriental Venice. As there is no tide and apparently no current, the water is unbelievably dirty and stagnant. Nevertheless, on almost every doorstep one sees a group of women washing rice or vegetables.

which appears on our tables as a foundation for Worcestershire and other sour sauces, and which, in the form of bean cake and bean oil, is the most valuable export to the United States from Manchuria.

Potatoes were imported about 1600 A. D. from Manila, but white potatoes, except in Manchuria and northwest China, are not popular. Sweet potatoes, on the contrary, are great favorites all over the country, being planted in the north in ridges of air-dry soil and in the south in terraces.

Various gourd plants, including melons, are common everywhere. An odd corner of a farmyard or the roof of an outbuilding will often be utilized for some members of this plant family, most of which are of indigenous origin.

It seems strange that plants common to us, such as raspberries, blackberries, and loganberries, though grown in the open ports for the foreigner's breakfast

Photograph by J. C. Carter

MAKING MACARONI

Hung from pole to pole, the long strips are pulled out nearly to breaking point and are allowed to dry in the open. In making vermicelli and macaroni, which are peasant industries, wheat flour, rice paste, and green beans are used for the better grades, and sweet potatoes, or kaoliang (see text, page 487), with a small admixture of beans, for the inferior qualities.

Photograph by Joseph F. Rock

BOILING SUGAR NEAR CHEHU, YÜNNAN PROVINCE

When of the proper consistency, the syrup is poured into the small dishes which can be seen on the shelf in the rear. When dry, the dark brown cakes, over which swarm myriads of flies, are wrapped in bamboo sheaths and sent by mule caravans to the markets.

table, have never found favor with the Chinese themselves. Our popular fig, introduced by the Portuguese, was deliberately discarded "on account of its bad taste."

Yet we adapted from the Chinese, and eagerly made our own, the rhubarb, native of the provinces of Szechwan, Kansu, and of Tibet. It was an important feature of the overland trade with ancient Europe, and seeds were brought by a Russian caravan to the West in 1750, when three precious parcels were sent as a valuable gift by the Russian Government to the botanical societies of England, Scotland, and Germany.

In the north, the handsome castor-oil plant is a feature of the farms, where, planted in the form of a hedge, it divides fields or acts as a screen for vegetable gardens.

Photograph by W. A. McCurdy

HANGING "MIEN" OUT TO DRY

The Chinese eat quantities of this favorite food, which resembles our noodles or vermicelli, and is familiar to Americans in "chow mien," the fried noodle dish served in Chinese restaurants.

TEA AND SILK ARE CHINA'S TWO GREATEST MONEY CROPS

The cultivation of tea is one of China's two greatest industries. The date of the introduction of this valuable plant into the Middle Kingdom appears unknown. "It was," says King, "before the beginning of the Christian Era, and tradition would place it more than 2,700 years earlier." Not until the sixth or seventh century A. D., however, did it spread over the whole country.

India has proved such a successful competitor abroad that the romantic days of the China tea trade, when fortunes were made in a twelvemonth and clipper ships raced across the Pacific with the new season's leaf, are over.

But China's silk production still holds its own. "Founded on the domestication of a wild insect of the woods, continued for more than four thousand years, expanding until a $1,000,000 cargo of the product has been laid down on our western coast at one time, and rushed by special fast express to New York City for the Christmas trade"—the annual export of silk from China runs into many millions of pounds.

As the young worms require as much as 123 pounds of mulberry leaves for food

Photograph by Karl W. Scheufler

CHINESE JUSTICE METED OUT TO BANDITS IN FUKIEN PROVINCE

The heads are hung on poles for a few hours until a cage can be made and then the receptacle containing the gory object lessons is exposed to view from some convenient telegraph pole, so that all may see the sad end of bandits.

to produce one pound of silk, much ground space is perforce devoted to mulberry orchards in "silk provinces" like Chekiang and Kiangsu. But, with his usual instinct for economy, the Chinese farmer has learned to utilize the space between the trees for beans or clover or to plant his trees wherever possible on the narrow embankments between rice fields.

It is a curious fact, moreover, that a periodical exchange of soil between rice fields and mulberry orchards improves both crops, and of this peculiarity the Chinese have been quick to take advantage.

Cotton probably ranks third among the commercial crops of the eighteen provinces. In many places it is the most valuable product of the soil, and "enjoys the distinction of being perhaps the only article, except staple foodstuffs, which is to every man, woman, and child an absolute necessity," as winter clothing is made of cotton wadding rather than wool, which is scarce and dear.

After the first frost, when the best of the season is over, though the cotton pods continue to open, it is the right of the poor to pick cotton wherever they can find it.

FUEL IS A VITAL PROBLEM

Everywhere in this old country, whose people are accustomed to crowding and being crowded, not an inch of arable land is wasted. Yet large pieces of valuable

A CHINESE FARMER STARTS TO MARKET WITH A LOAD OF VEGETABLES

Instead of dividing his burden, he uses a stone to balance the free end of his carrying pole.

Photographs by J. T. McGarvey

HAULING PUMPKINS TO TOWN IN CHIHLI PROVINCE

For adaptability to the worst road conditions no vehicle equals the wheelbarrow, and none is more used in China except the carrying pole (see above). Nearly the whole load is balanced on a high, massive wheel with a broad tire. A shoulder-band from the handles of the barrow relieves the strain on the hands. When the wind is favorable, it is not unusual to hoist a sail to gain propelling power.

Photograph by P. H. Dorsett, courtesy U. S. Department of Agriculture

HULLING AND DRYING WALNUTS NEAR THE VILLAGE OF LI KE CHUANG, IN CHIHLI PROVINCE

The nuts are picked from the trees, stacked in cone-shaped piles and covered with millet straw or some similar plant material. They remain in these piles for 8 to 10 days and are then hulled by hand, principally by women and children, who receive two coppers per basket of hulled nuts.

Photograph by Adam Warwick

CULTIVATING JASMINE PLANTS FOR FLAVORING TEA: FUKIEN PROVINCE

In fields adjacent to the tea plantations jasmine plants are trained over trellises. The fragrant flowers are used to flavor the finer grades of tea leaves. The cultivation of tea is one of China's greatest industries (see text, page 491).

Photograph by Joseph H. Ehlers

SHANTUNG COOLIES TRUNDLING WHEELBARROW-LOADS OF GARLIC TO MARKET

A complete list of the vegetables exposed for sale in a large Chinese market such as that at Shanghai would require several pages of print, but among the garden produce most in evidence are two kinds of onions, the indigenous bulbless and the imported bulb variety; many kinds of cabbage, crisp lettuce, clover shoots (a great delicacy among Chinese epicures), tomatoes, carrots, and radishes. There are also red and white turnips, three kinds of mustard, string beans, yellow beans, red beans, winter peas laboriously trained to canes, beets, artichokes, parsnips, ginger roots, the last cultivated since very ancient times. All these vegetables, though most carefully grown, are somewhat tasteless and watery compared to ours.

Photograph by Charles R. Frazier

"PIGS IS FREIGHT" FOR HUMAN BURDEN-BEARERS IN CANTON

The average farmer can afford to eat pork only once a year—at the New Year festival—and beef even more rarely, if ever. Goats are raised for their skins (see, also, text, page 499).

Photograph by Maynard Owen Williams

GATHERING GRASS FOR FUEL, WHERE COAL IS TOO EXPENSIVE

In the northern provinces of China the rank grass that grows on graves (see illustration, page 478) is cut for fuel, a task usually delegated to the children of the farm household.

Photograph by Sidney D. Gamble

PIGS LAID OUT FOR SALE

At the Peking market the pigs are placed along the side of the road, their four feet closely tied together. After inspecting the animals the buyer makes his offer, but usually two are made—one spoken, for the benefit of near-by listeners, the other, made by signs with the hand hidden in the seller's sleeve, which is the actual offer. When a bargain is made a stick is put between the pig's feet and it is carried off, head down and squealing, to the slaughterhouse (see, also, page 500).

food-producing soil are cheerfully given over for the graves of ancestors. It is a voluntary burden accepted by the living because of a strong filial affection for dead generations (see page 478).

With the hills long since denuded of trees and brushwood, except around temples and tombs, the question of fuel in China is vital.

In Chihli and Shantung the farmers solve the problem as best they may by burning the coarser stems of crops, such as cannot be eaten, fed to animals, or otherwise made useful, in a built-up masonry *kang*, or platform, about 10 feet long, 6 feet wide, and 2 feet high. This platform is practically an oven, warmed by a single fire, and serves as bed, chair, and table all winter. Wadded clothing also helps to make fuel for warmth of body unnecessary.

THREE CANALS PER MILE

Throughout the vast Canton delta, and still more extensively in the Yangtze Valley, a remarkable canal system exists. In fact, it is the long-standing efficiency of the Chinese in matters of water drainage and canalization which, together with the Chinese hieroglyphics, originated the theory of their kinship to the oldest civilization known—in Chaldea.

Between Hangchow and Shanghai there is an average of three inland waterways per mile, all, including such adjuncts as embankments, dikes, and levees, constructions of very early inception.

They have persisted through the recorded history of China and still serve their purpose; for to-day, as four thousand years ago, the farmer draws water from them for his fields, hitching his buffalo to the power wheel of a wooden pump on the bank.

His second buffalo, perhaps with a calf, is resting near by, waiting to take a turn at the 10-hour working day, in charge of one of the children in whose hands the otherwise intractable animal is as docile as a lamb. Such a man, owner of several beasts, belongs to the better class and considers himself lucky and prosperous.

THE FARMER HAS FEW BEASTS OF BURDEN

In Shantung and Honan farmers usually keep a few cows, but cattle are too rare and too valuable in China to be used by the natives for meat. Such a luxury is tasted only once a year, when, at the New Year festival, one of the black pigs to be found in every farmyard is killed for the feast.

Goats are sometimes kept for their skins, sheep are raised in small flocks for their flesh and wool, and, in Chihli, the famous white Peking ducks are bred to the immense profit of the lucky farmer whose land abuts on the arm of the Grand Canal.

All the smaller domestic animals share the family living room. "The gintleman that pays the rint" grunts and squeals under everyone's feet; the hens roost in a warm corner near the kitchen stove. There are no carpets to be muddied, no furniture, save simple wooden benches and tables, to be scratched.

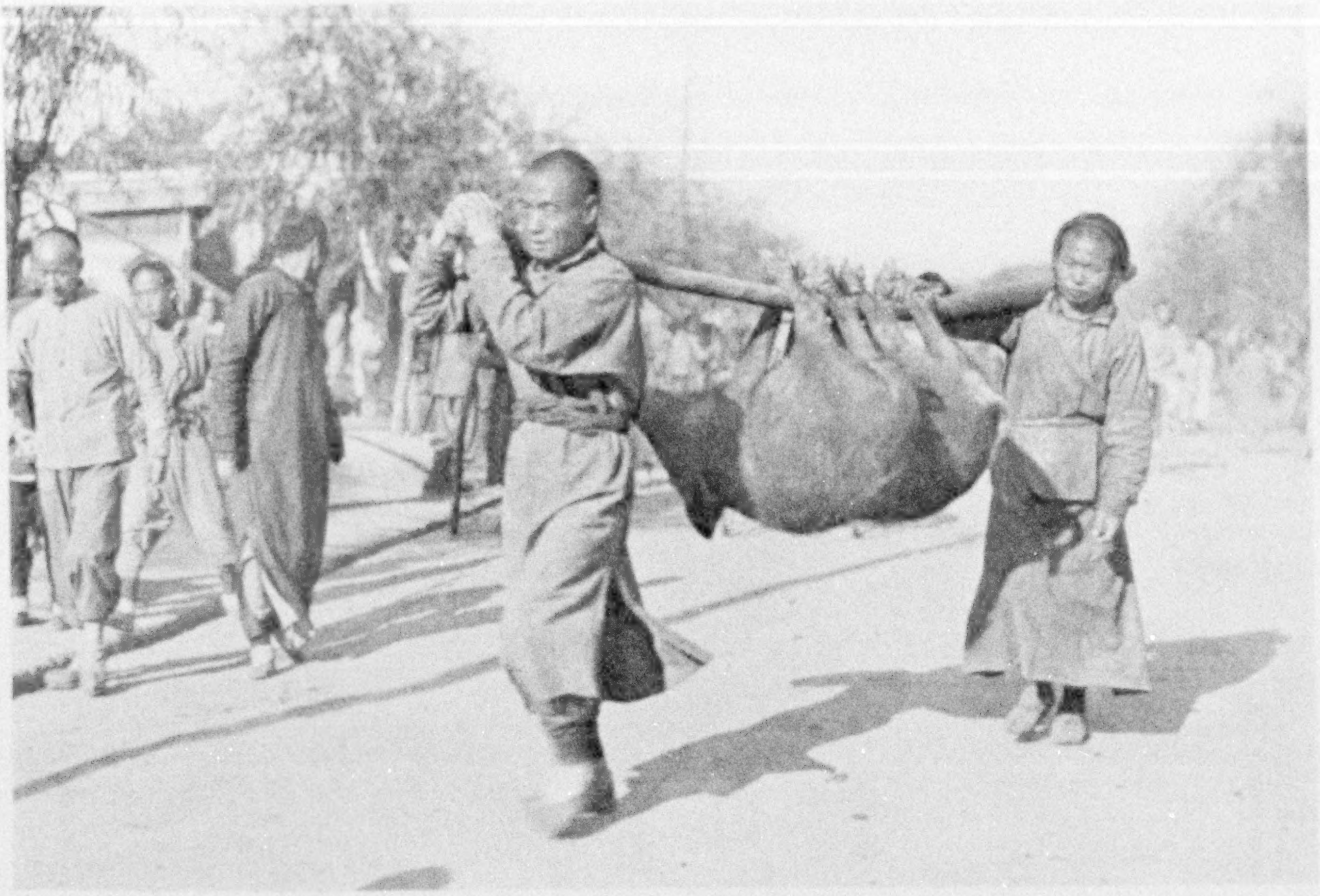
In fact, the average Chinese farmhouse is the acme of discomfort, according to Western ideas. As a rule, it contains not more than three rooms around a mud courtyard: a central kitchen, with the shelf for the Kitchen God's shrine, and sometimes the tablets of the ancestors; and one or two sleeping rooms adjoining it, with wide kang beds often warmed by a connecting brick flue with the waste heat from the cooking.

THERE IS NO WASTE IN CHINA

This is but one small economy among many which are daily practiced in the housekeeping arrangements. There is no waste in China, where the intensity of the struggle for existence is extraordinarily great—how great is, perhaps, best illustrated by the value of the smallest currency unit, the cash, 1,500 to 2,000 of which are in many districts equal to only one gold dollar.

Indeed, an intense individual economy, in fuel, in food, in clothing, is the dominating characteristic of China's farming population—a trait highly developed by the fact that one season's drought may spell famine to families that have just enough to carry them from harvest to harvest.

Yet, despite the number of mouths he has to feed, for families are always large in China, and the fact that he toils early and late, utilizing every scrap of daylight, the Chinese farmer is always smiling, polite, and apparently contented. He is



Photograph by Sidney D. Gamble

BOUND FOR A PEKING SLAUGHTERHOUSE

The squealing of the porkers as they are driven to market early in the morning and, later, as they are transported, one by one, to the slaughterhouses in the side streets, can be heard throughout a large section of north Peking (see, also, page 498).

blessed with great physical endurance and a profound moral philosophy.

His wife, though too often a drudge, surrounded by a pack of children that she nurses herself until they are two or three years old, is far from discontented. His sons and unmarried daughters, stalwart and sound in body and in mind, work beside him willingly.

His grandchildren begin to take their share of the daily tasks almost as soon as they can toddle, or play nursemaid to still smaller brothers and sisters (see illustration, page 473).

Telephones and automobiles are unknown conveniences to these toiling millions, but most of the farmer folk in China have the advantage of living close to their neighbors, though each farmhouse is shut off by a solid earth wall as high as the eaves.

The habit of gathering together in villages has existed in the Middle Kingdom from time immemorial and persists for the sake of mutual security and society—a great convenience in a land where the danger from brigands is often considerable.

Moreover, the Chinese are a sociable people, and a man who is not a good mixer is looked upon with suspicion in country districts. Neighbors, friends, often kinsmen, it is but natural that the simple pleasures of their lives should be shared in common—a temple festival, a rare theatrical performance, a gossip by the roadside at the sunset hour.

Though miserably lodged and poorly fed, the Chinese farmer and his family remain, as they have always been, under no matter what form of government, worthy exponents of true democracy. They are conscious of no inferiority; they know themselves to be the backbone of their country and, as such, make a pleasure of self-denial, drawing satisfaction from work well and thoroughly done.

They do not, like our Puritan ancestors, "wrest a living from the soil," but work in partnership, as it were, with Nature, loving and understanding the land.

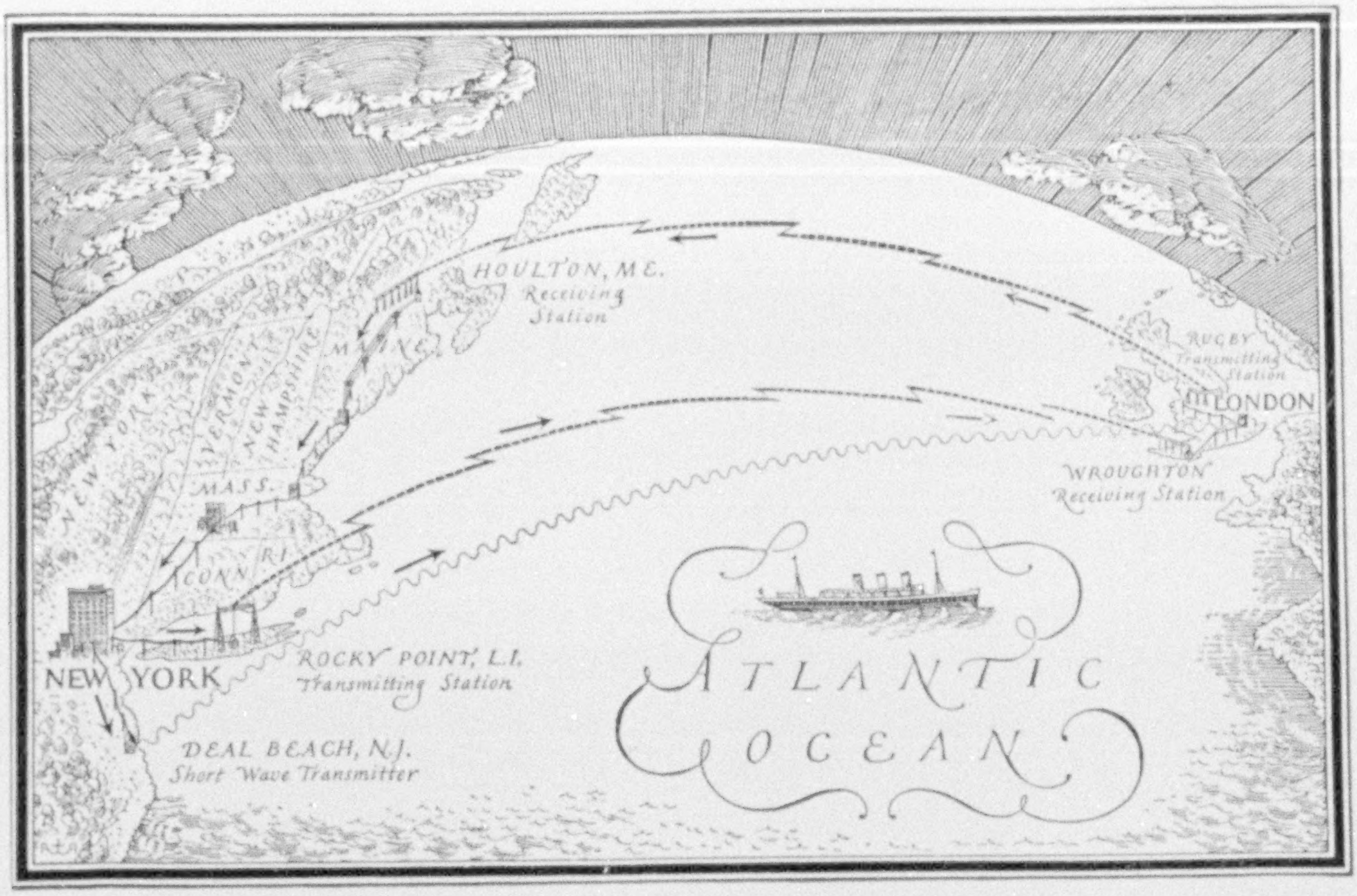
The more we know them, the more we appreciate what worthy men they are, these farmers since the days of Noah, with their frugality, their industry, and their endurance beyond all praise.

The soup known round the world

Travelers in distant lands know how rare it is—and how welcome —to be greeted with some article of merchandise whose familiar label is like a friendly face from "back home." . . . In all the great seaports of the world the Red-and-White Campbell's Label you know so well flashes its message of reminiscence. For exceptional Quality, exceptional Convenience, exceptional Adaptability to the universal human demand know no geographical boundaries. . . . All men like and need Soup. Campbell's introduced it in a new form to the world. Better, easier to serve, available to everybody. So the world reached out its hand for it.

Campbell's Soups

LOOK FOR THE RED-AND-WHITE LABEL



The Radiophone's Meaning

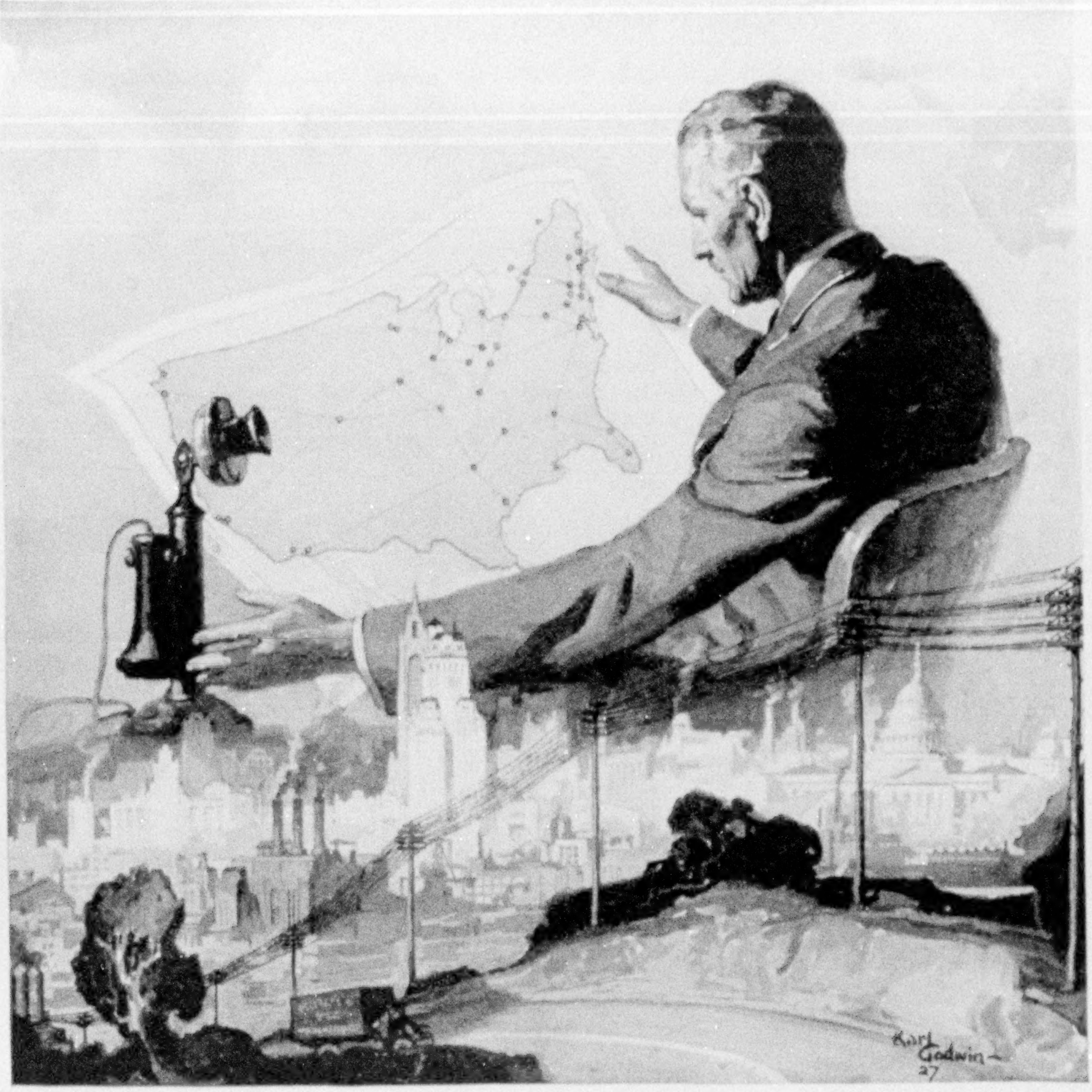
An Advertisement of
the American Telephone and Telegraph Company

AN ADVENTURE in communication was made last January when transatlantic radio telephone service was established between New York and London. There had been previous tests and demonstrations. Nevertheless, the fact that at certain hours daily this service was made available to anyone in these cities from his own telephone, created such public interest that for several days the demands for overseas connections exceeded the capacity of the service.

It was then demonstrated that there was a real use for telephone communication between the world's two greatest cities. It was further demonstrated that the American Telephone and Telegraph Company, with the co-operation of the British Post Office, was able to give excellent transmission of speech under ordinary atmospheric conditions.

In accord with announcements made at that time, there will be a continued effort to improve the service, extend it to greater areas and insure a greater degree of privacy.

It is true that static will at times cause breaks in the ether circuit, but a long step forward has been made towards international telephone communication and more intimate relationship between the United States and Great Britain.



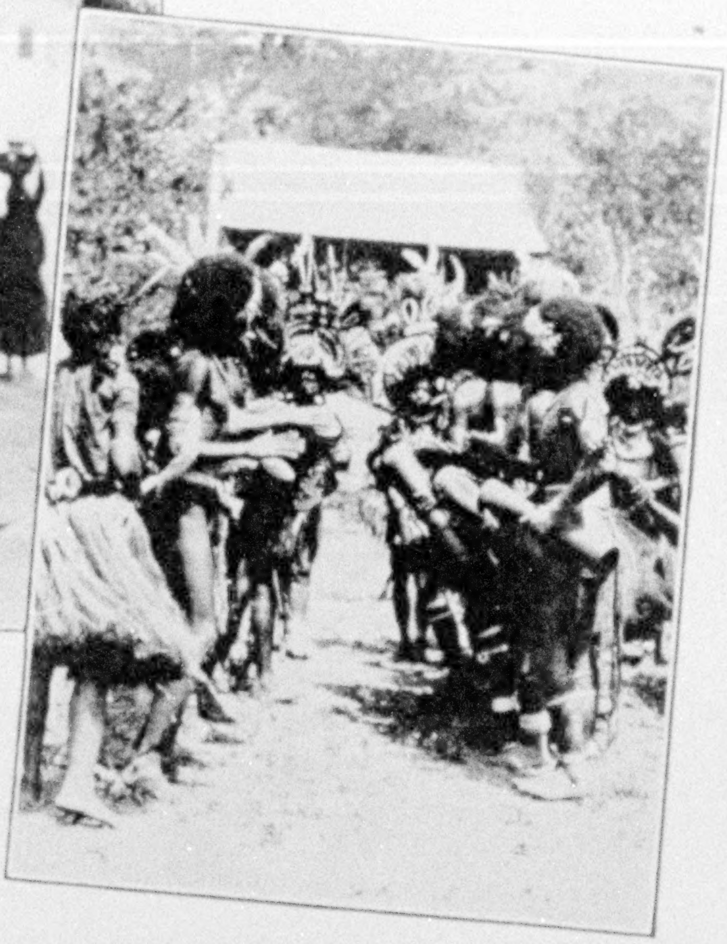
—*for quicker action*

A network of over 11,000 miles of private wire connecting National City offices in fifty leading cities keeps bond investors everywhere in almost instant touch with the great investment centers. When you wish to buy bonds, obtain market quotations or other investment information, just call our office nearest you. Our representatives are equipped to give you quick, dependable service. Ask for our Monthly Bond Circular.

The National City Company

National City Bank Building, New York

CAREFULLY SELECTED BONDS OF FOREIGN AND DOMESTIC GOVERNMENTS, STATES, MUNICIPALITIES, RAILROADS, PUBLIC UTILITIES AND INDUSTRIAL CORPORATIONS.



Photos by Howard B. MacDonald
World Traveler and Lecturer

Scenes like these seldom repeat

THEY flash into life . . . and then fade out. Travel is literally filled with such seconds. You never know when to expect them . . . and that adds to their thrill . . . makes them precious.

On dark days in the narrow streets of a bazaar, in the blinding glare of a field of snow, in close court yards and shadowy places, dramatic, beautiful scenes occur. Will your camera catch them? Yes, if it is a GRAFLEX.

Consider these contrasting pictures. The same speed lens that captured so perfectly the spirit and action of the snow scene also made possible the atmospheric study of the native women of Nadipur, India. Note even the detail of the decorated walls.

No other camera save a GRAFLEX could have achieved such remarkable results. No other camera would have made the attempt. GRAFLEX never fails. The extra fast lens gathers more light; the GRAFLEX shutter curtain admits more light; the focusing hood shows you—right side up—exactly how your picture is going to reproduce. *Simple* in operation and *sure* in results. Beyond question it is the camera for you to own and use.

Revolving Back GRAFLEX series B. Compare its size with a Baedeker—and a handle to carry it by.

Ask your nearest dealer to show you a GRAFLEX, *or write for booklet "G" direct to*

THE FOLMER GRAFLEX CORPORATION
ROCHESTER, NEW YORK
Sold by Eastman Kodak Company Dealers

27th to 4th Place in Three Years

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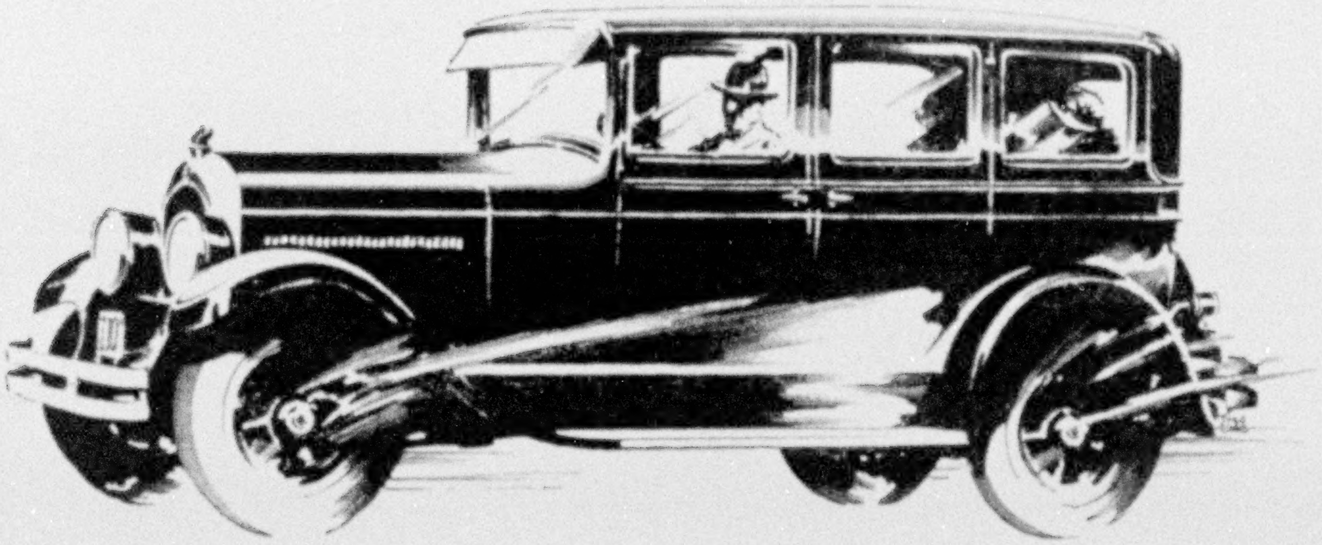


CRAFTSMANSHIP

Eight body types priced from $1395 to $1795, f. o. b. Detroit, subject to current Federal excise tax.

In the beginning a fascinated public bought the Chrysler "70" for the charm and freshness of its new performance and appearance.

Behind that first Chrysler, and the public's first enthusiasm for its new qualities, are now more than three years of experience.

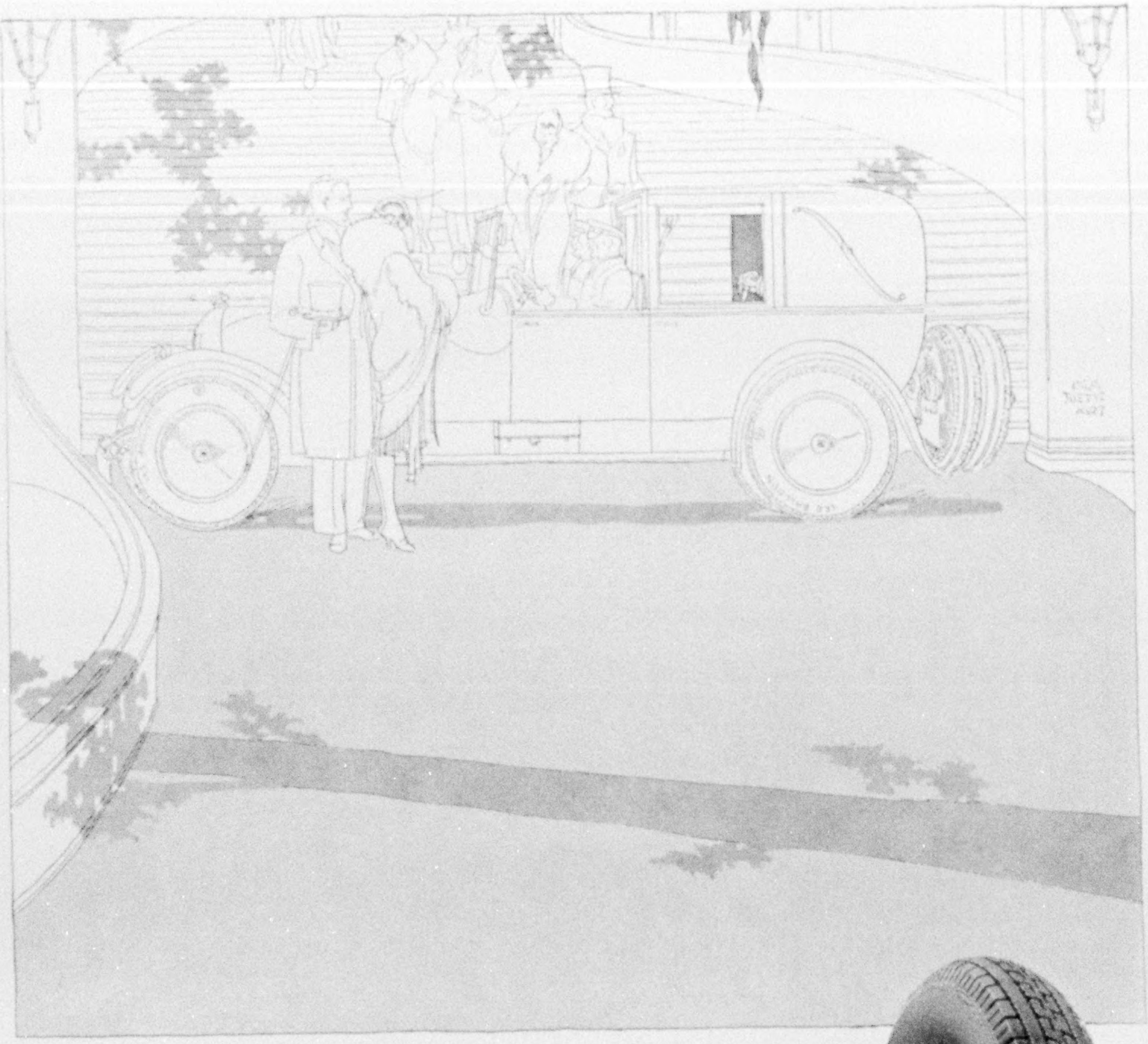
During those three phenomenal years—years in which public preference swept Chrysler from 27th to 4th place—motor car buyers have come more and more to know the substantial and solid qualities built into each and every Chrysler by its unique engineering and manufacturing plan of Standardized Quality.

They have found a dependability and long life in the "70"—proved by hundreds of thousands of enthusiastic owners—combined with those elements of progressiveness through which Chrysler has steadily maintained the speed, dash, beauty, luxury, economy and safety of the finer Chrysler "70" of today, as far in advance of its field as at the time of its introduction.

All Chrysler cars are protected against theft under the Fedco System.

Chrysler dealers are in position to extend the convenience of time payments. Ask about Chrysler's attractive plan.

CHRYSLER MODEL NUMBERS MEAN MILES PER HOUR



TIRES BY LEE *of* CONSHOHOCKEN

You want the same excellence, the same high order of craftsmanship in your tires as in the rest of your car. You want assurance of long-lasting, uninterrupted comfort and safety—plus economy.

You can be certain of excellence only when craftsmanship permits no compromise with perfection.

LEE of Conshohocken stands for everything fine and true in tires, the same today as twenty-five years ago. Craftsmanship that is traditional. Value without parallel.

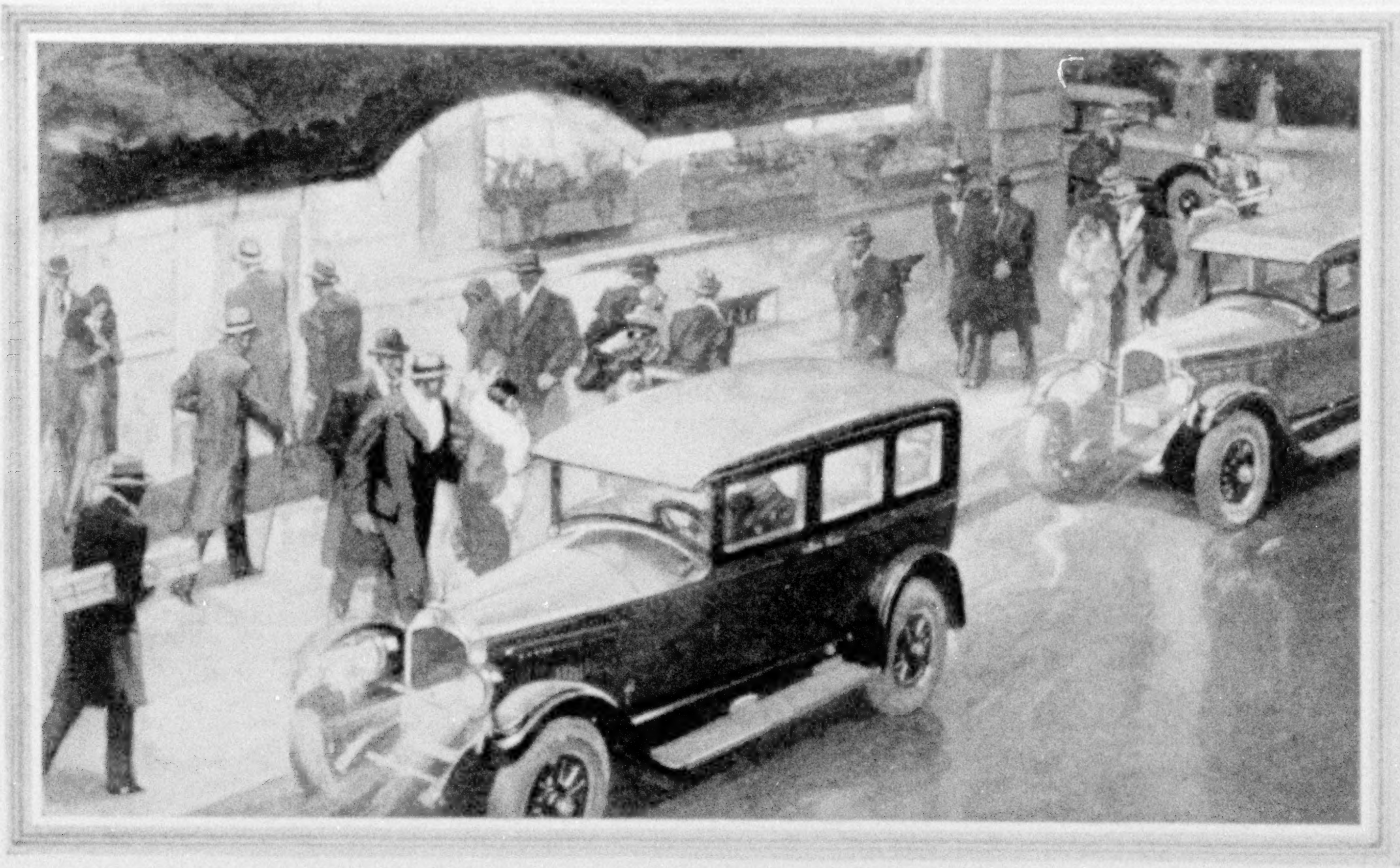
"Tires by LEE of Conshohocken" is a phrase as full of meaning as the tires are full of wear. Cost no more to buy and far less to run than tires of conventional make.

You can always depend upon Lee Tires and Lee service dealers to make your tire money go the farthest.

Pneumatic tires for passenger cars, trucks and buses. Staghound solid tires for commercial use. And the celebrated Lee Puncture Proof Tires both high pressure and balloon.

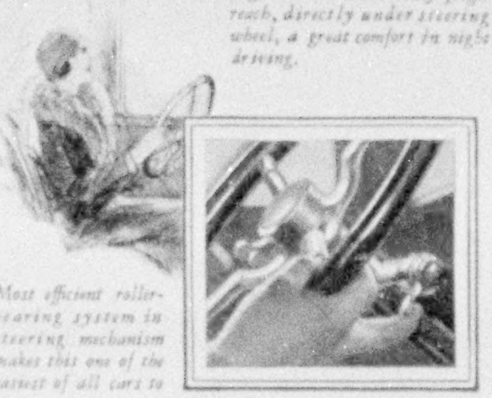
LEE *of* Conshohocken

ALL THE BEAUTY AND GOOD TASTE THE SMART WOMAN OF TODAY DEMANDS PLUS PERFORMANCE AND SAFETY ADVANTAGES YOU NEVER HAVE KNOWN BEFORE.



THE "SEVENTY" WILLYS-KNIGHT SIX SEDAN

AMERICA'S most up-to-date car. "And certainly one of the most beautiful," will be your own added comment upon examination of the "70" Willys-Knight Six.



Light control within easy finger reach, directly under steering wheel, a great comfort in night driving.

Most efficient roller-bearing system in steering mechanism makes this one of the easiest of all cars to steer.

An even and apparently endless flow of power (the patented Knight sleeve-valve motor of the "70" Willys-Knight Six develops more power than any other stock engine of its size ever produced in this country) . . .

Remarkable handling ease (a steering mechanism with the most efficient roller-bearing system of any American-built car) . . .

The liveliest car of its price ever built (accelerates from 5 to 40 miles an hour in 14½ seconds, a new record for activity).

With a speed range of 60 to 70 miles an hour, indefinitely sustained . . . Positive mechanical 4-wheel brakes, the same type as that used in over 97% of the finest European cars . . . You can drive the "70" Willys-Knight Six at any speed you will, always with a comforting sense of perfect control, perfect safety.

A car immune from carbon troubles. No valves to grind . . . A car whose exclusive Knight sleeve-valve motor, alone of all automobile motors, actually *improves* with use.

You really owe to yourself a thorough knowledge of the new "70" Willys-Knight Six before committing yourself to any less modern car.

"70" Willys-Knight Six prices from $1295 to $1495. Willys-Knight Great Six, "for those who want the finest," $1850 to $2295. Prices f. o. b. factory and specifications subject to change without notice. Purchases may be arranged on convenient credit terms. Willys-Overland, Inc., Toledo, Ohio. Willys-Overland Sales Co., Ltd., Toronto, Canada.

"70" WILLYS-KNIGHT SIX

Mountain climbing—
another glorious sport at

Glacier National Park

Opens June 15 *to Sept.* 15

Come this summer to Glacier National Park and explore the famous Grinnell Glacier—one of the sixty glistening bodies of living ice, high on the shoulders of the Continental Divide. In this incomparable Alpine playground you can also swing along flower-fringed trails to Iceberg Lake—a fascinating vest-pocket polar sea; fish in the many lakes and streams of this last home of a vanishing race—the Blackfeet; hike or ride horseback to colorful canyons and flashing waterfalls.

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This, the finest train to the Pacific Northwest, takes you direct to Glacier National Park. After visiting Park see Spokane, Seattle, Tacoma, Portland. Choice go-as-you-please tours or Burlington Escorted Tours.

Ready during the 1927 season—the new Prince of Wales Hotel in Waterton Lakes National Park, virtually an extension of Glacier National Park across the international boundary into the Canadian Rockies.

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a dependable railway

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Please send me free book "The Call of the Mountains". I am interested in

☐ *Pacific Northwest Tour.* ☐ *Glacier National Park Tour.* ☐ *Burlington Escorted Tours.*

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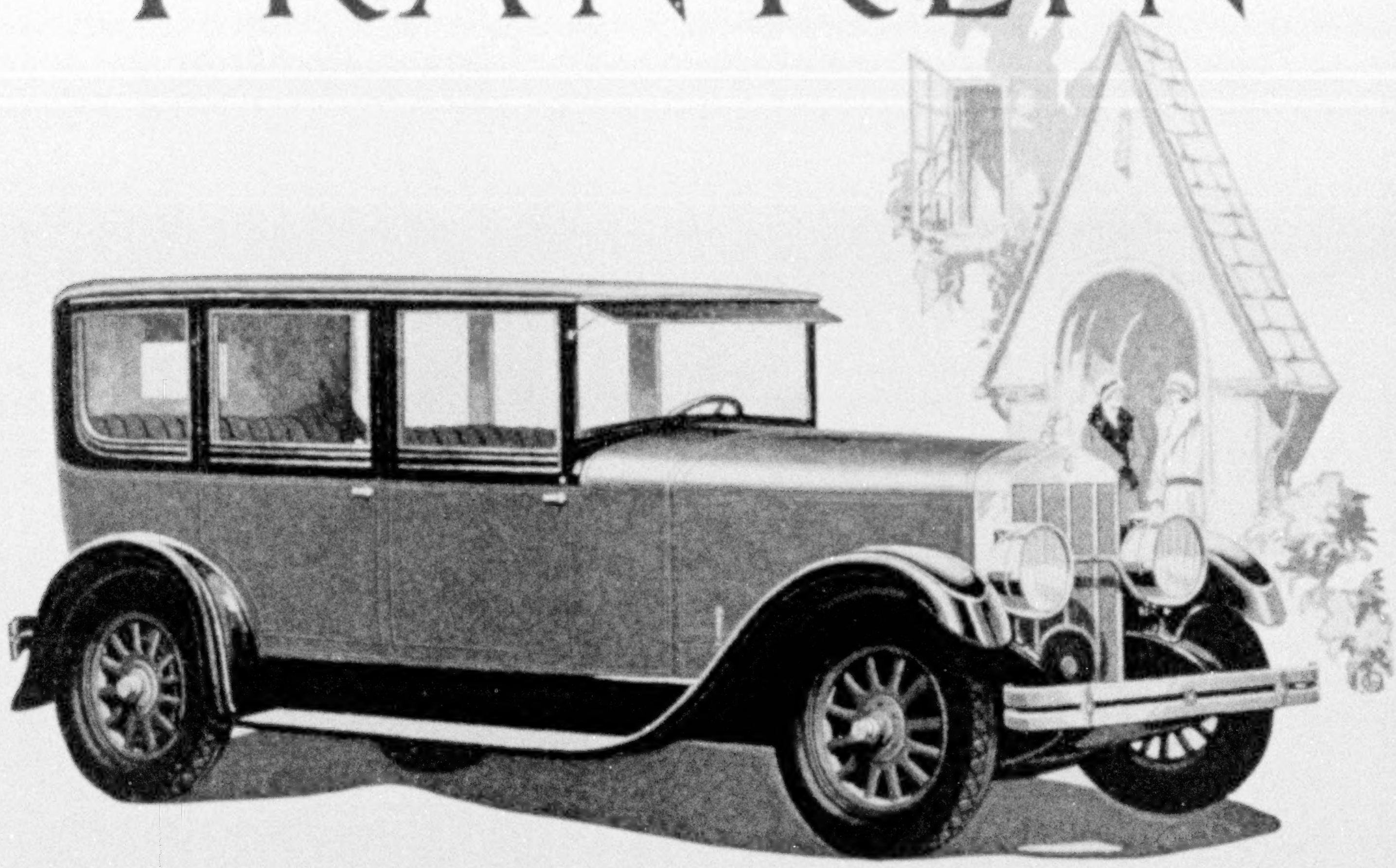


Try This Most Powerful Franklin

IT IS THE WORLD'S SMOOTHEST CAR

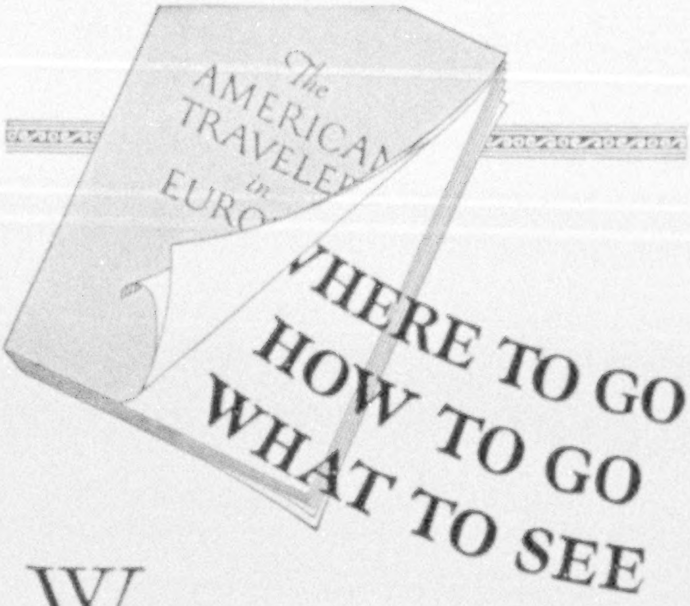
Do what new thousands are now doing! Take the wheel of the 25th Anniversary Franklin or lounge back in one of its luxurious seats. Either way you will be delighted when its powerful motor gets into action—a combined thrill and ease which no other car can offer.

Powered to hold its own in any company, today's Franklin is smoothed and silenced to a point beyond all comparison. Its freedom from vibration *at all speeds* is constant evidence of the Franklin policy of always keeping ahead.

To those who already own or know Franklins, this is merely an important new extension of Franklin leadership. To those who do not, it is more—an interest-arousing development which leads straight to the most complete and satisfying automobile ownership obtainable.

Coupé now $2490, Sedan now $2790. Fully equipped, F. O. B. Syracuse, N. Y. Inquire about the 25th Anniversary Easy Ownership Plan.

The 25th Anniversary Franklin



WOULDN'T *you* as a potential American traveler in Europe like to have this helpful American Express booklet "The American Traveler in Europe"?

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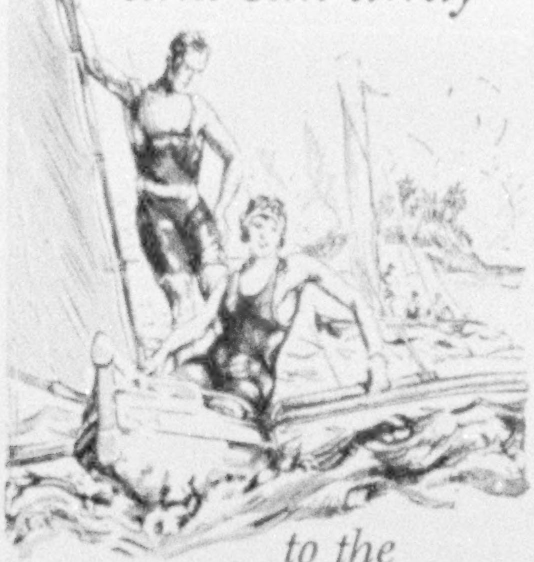

to the
ISLAND *of your* DREAMS

HAVEN'T you ever wished to be a footloose, carefree beachcomber on a palm-fringed shore—'way down in the warm South Seas?

. . . to spend happy vagabond weeks, day-dreaming . . . just listening to the lullaby of silken surf on coral sand . . . forgetting time?

Here in sunny Hawaii—less than a week's voyage—you can be as lazy as you like. A few days, and then you'll find new zest in golf—new vim in the morning plunge in Waikiki—new appetite in golden papaya and Kona coffee at breakfast—new thrills in peeping safely into a live volcano.

Four or five weeks and $400 to $500 cover the time and cost from the Pacific Coast, including steamers (round trip) and all expenses and sight-seeing. A great new hotel at Waikiki and a mammoth new liner now building. Sail direct from San Francisco, Los Angeles, Seattle or Vancouver—any steamship, railroad or tourist agent can book you right from your home.

Write today for illustrated brochure in colors.

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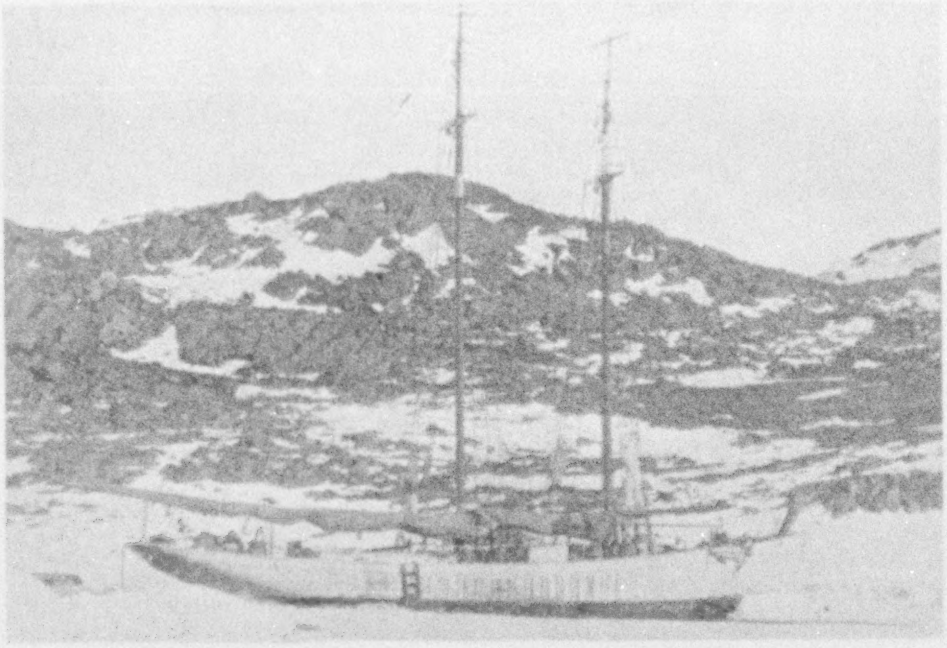

WHEN the *Bowdoin,* exploring ship of the MacMillan expeditions, makes ready to battle the North, nothing but quality goes into her preparation—because nothing but quality can survive Arctic rigors. Her hull, washed by big seas and battered by ice, is painted with

Patton's
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— economical because great covering capacity per gallon means low square-foot cost on the building, to say nothing of better property protection and longer service.

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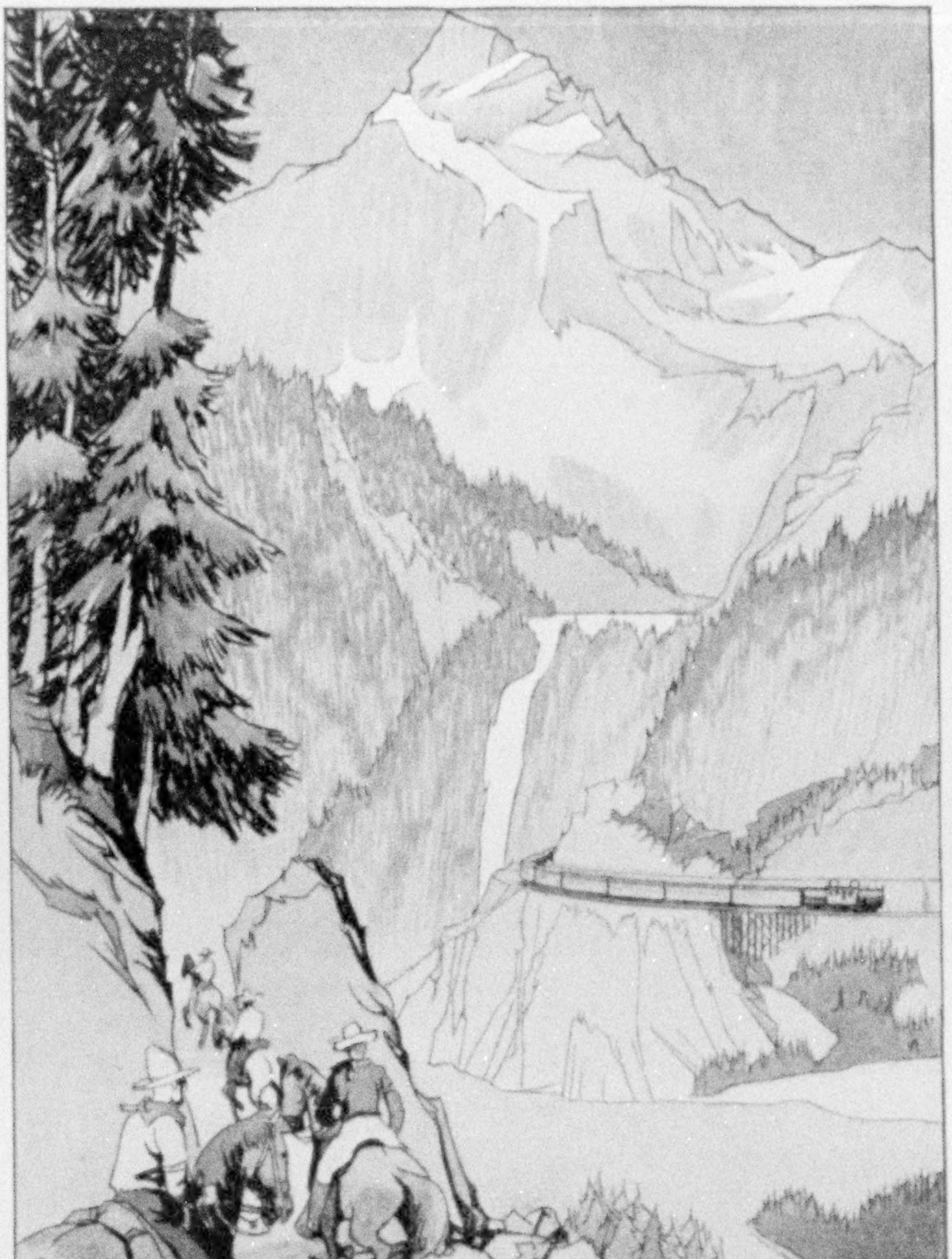
The entrancing Gallatin Gateway



THE glories of Yellowstone Park take on new meaning this year with our discovery of Gallatin Gateway!

It is the great sensation of vacationlands. Savage wilderness and the refinements of civilization touch with startling picturesqueness.

You may take the world-famous *Olympian* or the *Columbian* over the trunk line of the Milwaukee Road direct to Gallatin Gateway. There you will find the splendid new Gallatin Gateway Inn. Comfortable motors of the Yellowstone Park Transportation Company will take you smoothly, with hardly a change of gears, directly to Old Faithful and the geysers, through gloriously fresh, untouched country of startling beauty.

The thrill of discovery may be yours, *for out of the millions of people in this country, only a few have yet been given the opportunity to pass through Gallatin Gateway!*

This year, the first full season of travel through Gallatin Gateway to Yellowstone, we invite you to enjoy the rugged beauties of Gallatin Canyon, of brawling Gallatin River, of great mountains rising over 11,000 feet by the motor trail. Bear, cougar, mountain goat and bighorn sheep inhabit the forests.

SHORTEST AND MOST MODERN ROUTE TO THE PACIFIC AND THE ORIENT

Splendid accommodations

The striking feature of this new way into Yellowstone Park is its great comfort. Your trip to the Gallatin Gateway by the *Olympian* or the *Columbian* is a continued delight. The only electrified transcontinental railroad serving Yellowstone Park.

At Gallatin Gateway station the new Gallatin Gateway Inn stands with the silver-green mountains for a background, and charming Gallatin Valley, one of the most famous wheat sections in America, stretching in front. Meals are delicious, much of the produce being crisp and fresh from neighboring farms and ranches. The spice of mountain air gives a zest to appetites.

Every kind of sport may be enjoyed. Horseback riding. Mountain climbing and exploring. Fishing in snow-fed streams. Hunting. Motoring.

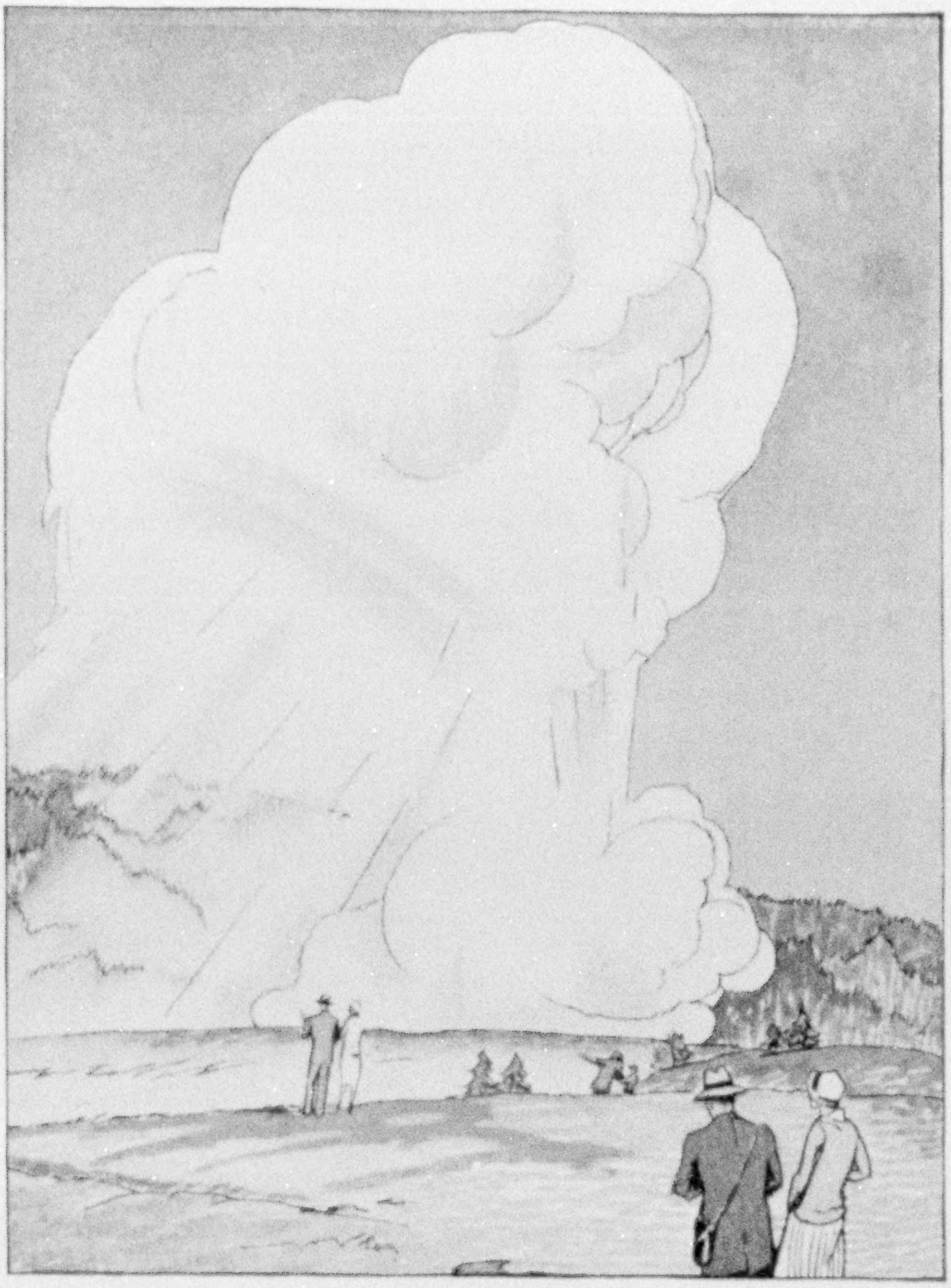
The Yellowstone Park motor coaches are the best and most comfortable built.

The fine new road upward through Gallatin gorge is not overcrowded with traffic. Instead you have the feeling of whirling through this glorious country with a few friends in your own private car. Everywhere provision has been made for your comfort.

The cost is quite reasonable!

The

to Yellowstone Park!



The swift road to happy days

THIS is the logical way to vacationland! The Milwaukee Road reaches all the glorious vacationland of the Northwest by the world-famous *Olympian* or by the *Columbian.*

If you are outward-bound for Alaska, the Far East, or the Islands of the South Seas, it will take you in luxury to shipside on Puget Sound. For 660 miles across four great mountain ranges *it is electrified—the world's longest electrified railroad,* the most modern achievement in smooth, luxurious motion.

If your destination is a favorite vacation spot, undoubtedly The Milwaukee Road leads to it. Gallatin Gateway to Yellowstone. Belt and Ranger Mountains. Rocky Mountains. Upper Valley and sources of the Missouri. Lake Pepin. Lakes and woods of Wisconsin and Minnesota. Bitter Root Mountains. Columbia River. St. Joe River. Lake Chacolet. Mt. Rainier National Park. Cascade Range. Puget Sound. The Olympic Peninsula. The great plains of Montana and the Dakotas. *All reached by trunk lines of the Milwaukee Road.*

The trip on the splendidly equipped *Olympian* is in itself an extraordinary experience. In all the comfort of a fine club you may sweep smoothly through the most diversified, most beautiful, and most interesting regions of America. Perfect service, delicious meals, and an unbroken panorama of stimulating scenes!

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TO PUGET SOUND
THE CHICAGO MILWAUKEE AND ST. PAUL RAILWAY
ELECTRIFIED

GEO. B. HAYNES, Passenger Traffic Mgr.
Chicago, Milwaukee & St. Paul Railway
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I am planning a trip ☐ to Yellowstone Park ☐ to the Pacific Northwest. Please send me your travel literature.

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34

THE land of mellow sunshine and invigorating climate. The land of mystic magnificence—of towering mountains, majestic waterfalls, beautiful rivers, and verdant veld. The land of modern cities and native kraals.

The land of beautiful flowers, sylvan glades, botanical gardens, and primeval forests. Where you can motor over fine roads or travel by fast luxurious trains.

Where you can see—

The Great Diamond and Gold Mines
The Quaint Kaffir Kraals
The Mighty Drakensberg Mountains
The Wonderful Victoria Falls
The Magic Cango Caves
The Beautiful, Speedy, Preening Ostrich
The Glorious Cape Peninsula

The South African Government Railways are internationally famous for comfort, speed, safety, and conveniences of dining and sleeping car service.

Write for free booklet, "Johannesburg," or send 12c (to cover postage) for fully illustrated 175-page travel book, "Cape of Good Hope."

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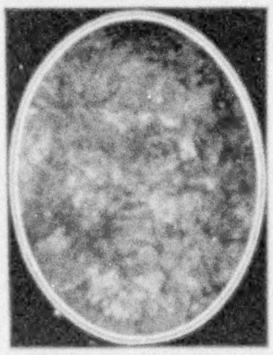
Your Family Portraits
Restored and Reproduced



From old daguerreotypes, faded photographs, tintypes, snapshots, etc. Have them reproduced privately in THE COPLEY PRINTS. These little pictures show what we can do also for YOURS.

As received

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It is not only the vogue to have portraits of your ancestors on your walls: they make treasured gifts to your relatives. One should have them copied, if only to provide against accident, loss, or fading.

Also Portraits Painted on Canvas. Oil Paintings Cleaned and Restored.

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Fine Art Reproductions of Distinguished American Art
In sepia and in color, $2.00 to $100.00
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A thousand years before the Romans

In Devon and Cornwall have been written Britain's history from the earliest ages. There are relics of temples dating back to the times of the pyramids, ancient Roman settlements and the homes of Drake and Raleigh. Also many bracing health resorts and golf courses—all within easy reach over the pathway of the Great Western Railway.

This year land at Plymouth and visit Devonshire where the language and customs are the same as yours. Direct lines to London.

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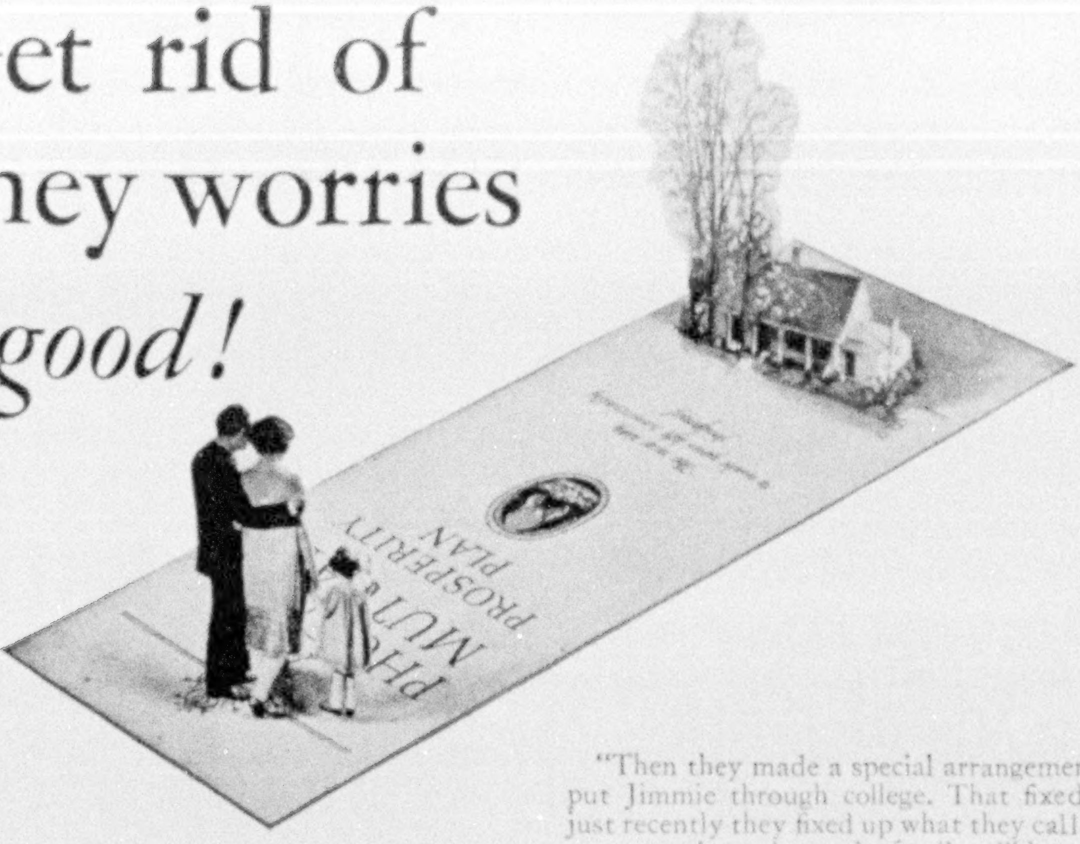
GREAT WESTERN
RAILWAY *of England*

Get rid of money worries *for good!*



TWO MEN were talking in a club-house reading room. "Everything's going pretty well with me—*now*," said one of them. "I make enough money to pay the bills, enough even to take a vacation now and then. But I sometimes wonder how it would be if anything happened to me. I know perfectly well the house might be sold, my son taken out of school . . ."

The other man smiled.

"That's just the way I was fixed," he said. "And then a funny thing happened. I answered an advertisement and got hold of a copy of the Phoenix Mutual 'Prosperity Plan.' Maybe you've heard of it. I filled it out.

"I was paying 6% interest on our mortgage at the time. The Phoenix people showed me how, by paying only about 1½% more, I could fix it so the bank would hand the home over to my wife clear of debt. That was the end of that worry.

"Then they made a special arrangement that will put Jimmie through college. That fixed *that*. And just recently they fixed up what they call an 'income agreement'—and now the family will have an income of $100 a month after I'm gone.

"So the only things I had been worrying about are taken care of—and all because I filled out that little piece of paper!"

WOULDN'T you like to make *your* life plan financially foolproof? Wouldn't *you* like to get rid of money worries for good?

You can. The coupon at the bottom of this page will bring to you, free, the remarkable Phoenix Mutual "Prosperity Plan."

Sending for it is the first step towards real independence—protection for you and your family no matter what happens—an education and every advantage for your children—leisure and comfort for yourself in your later years.

There's no obligation. Send for your copy *now*.

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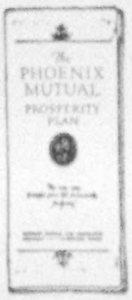
TO GET THESE . . . MAIL THIS

HERE are just a few of the things you can do under the Phoenix Mutual Plan.

1 RETIRE with an income when you are 60 or 65.
2 LEAVE your home free of debt.
3 SEND your children to college.
4 CREATE an estate.
5 MAKE sure your income will go on even though you become totally disabled.
6 LEAVE an income for your family.



PHOENIX MUTUAL LIFE INSURANCE CO.
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Send me by mail, without obligation, your new "PROSPERITY PLAN."

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DATE OF BIRTH ....

Spring time – an ideal time to go abroad

NOW before the summer rush starts—now when the breath of spring has made the old world gay and happy—is the time to go to Europe.

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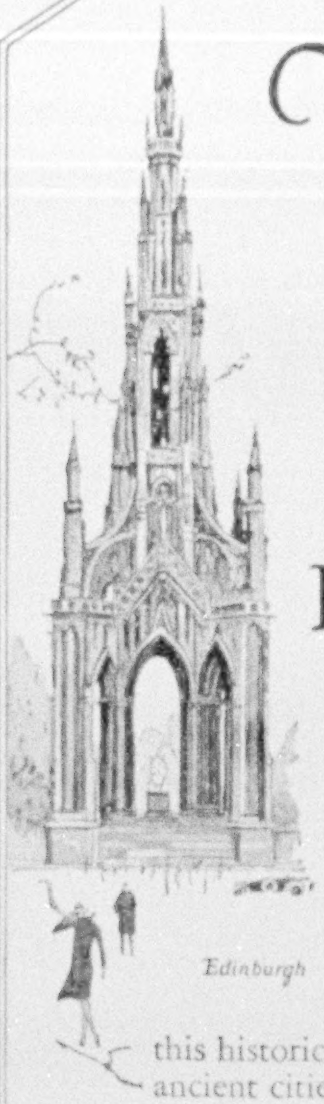

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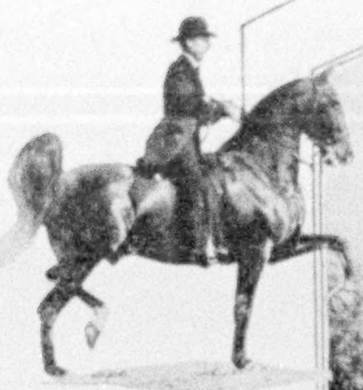

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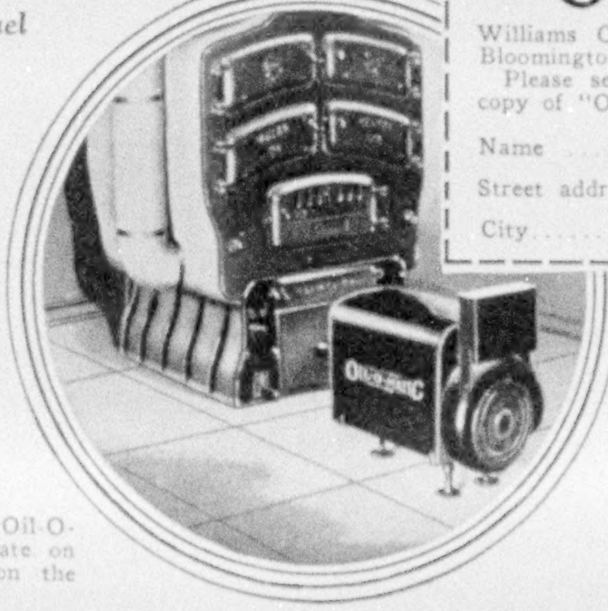

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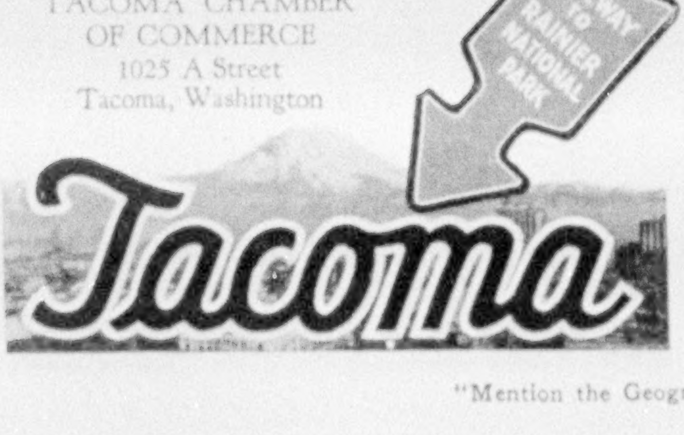

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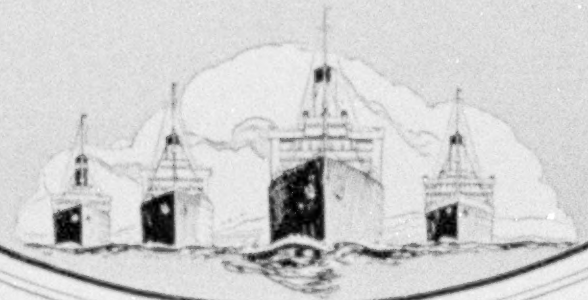

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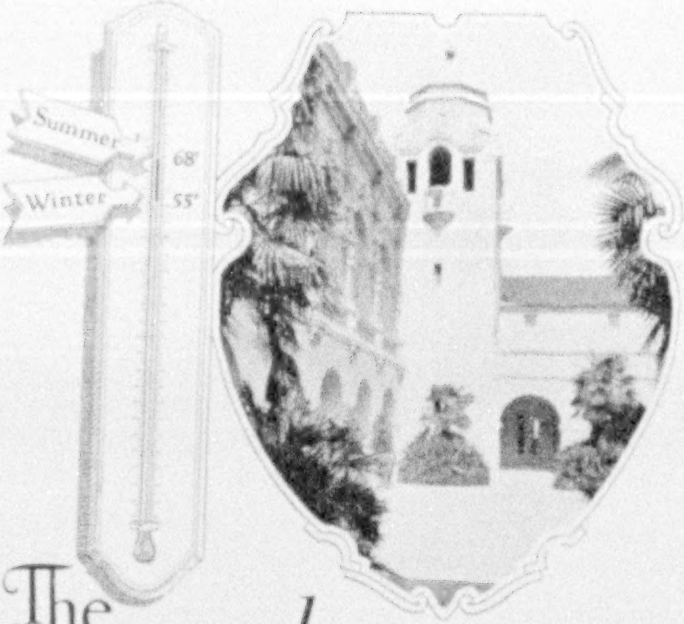

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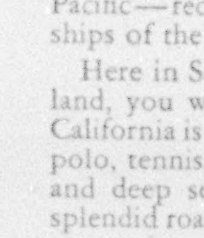

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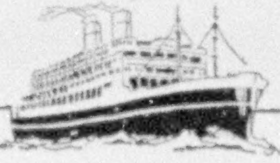

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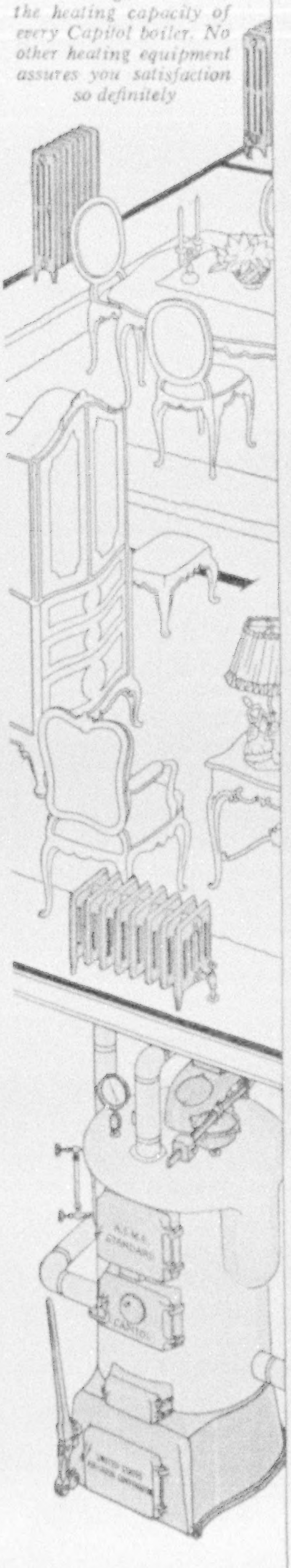

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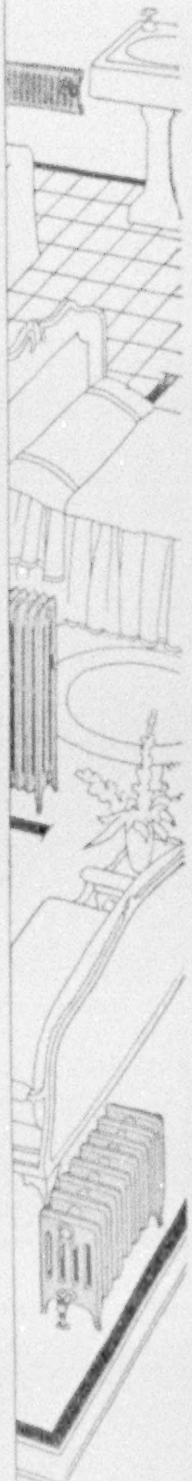

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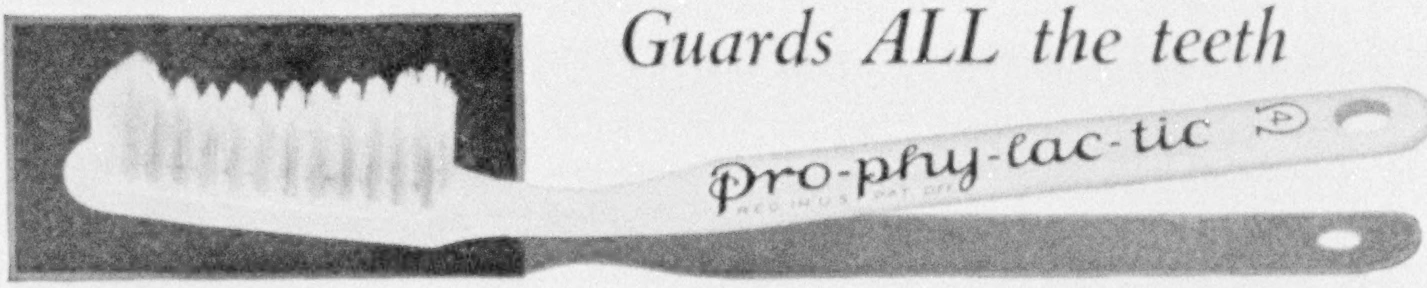

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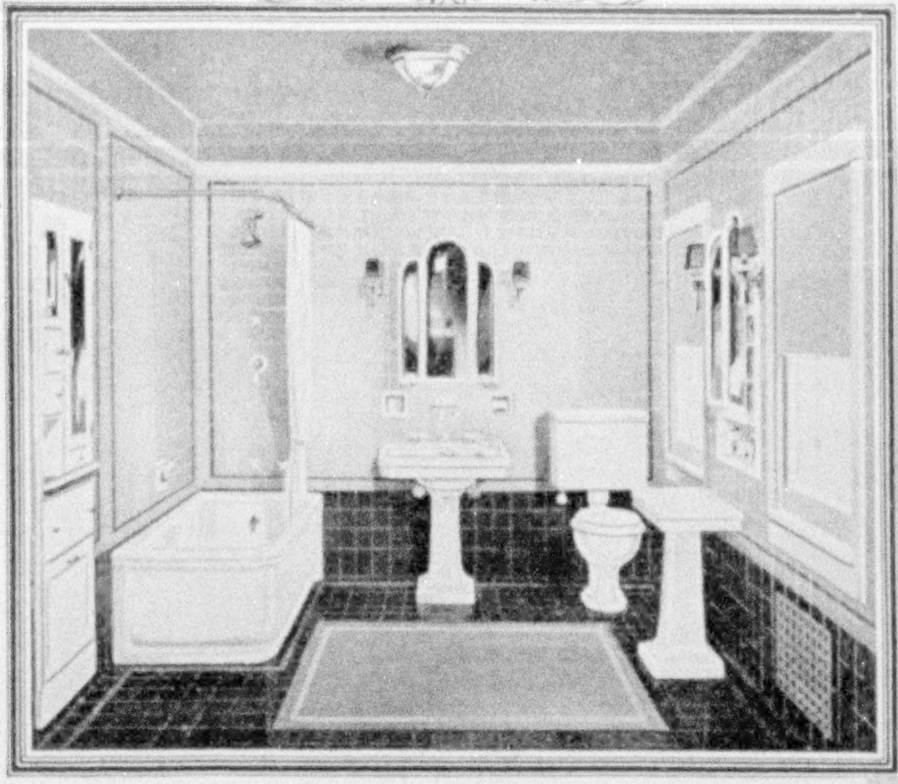

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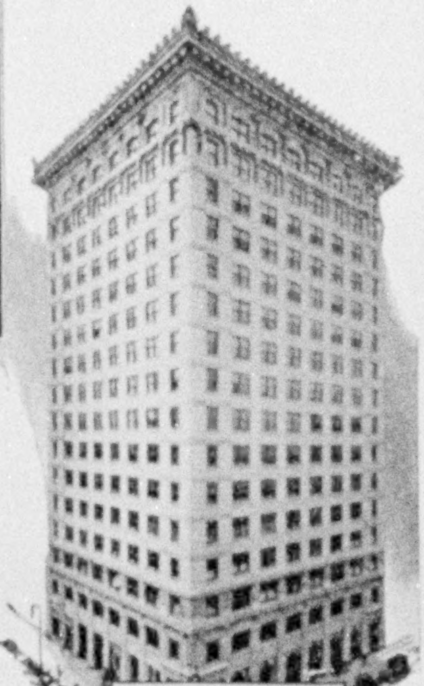

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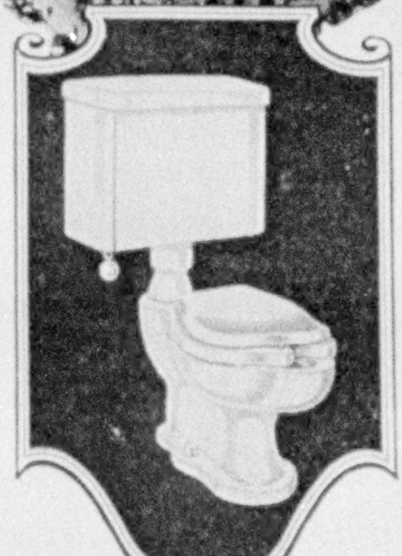

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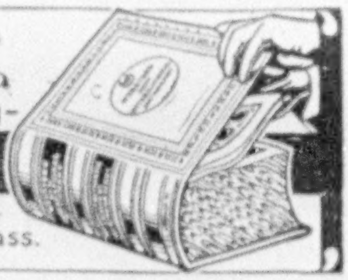

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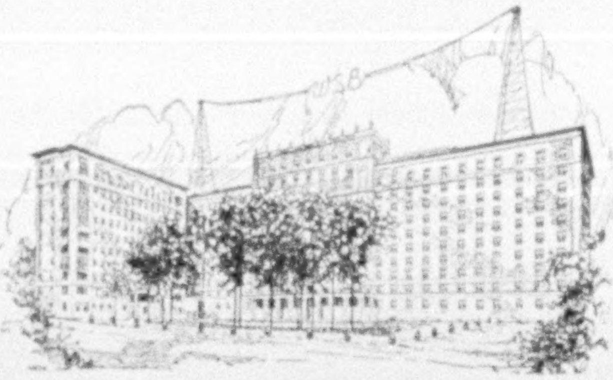

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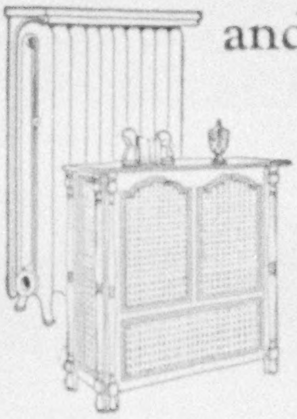

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THE many charming shades of color available in Face Brick permit, and indeed invite, the development of Spanish and Mediterranean types in this attractive and durable material.

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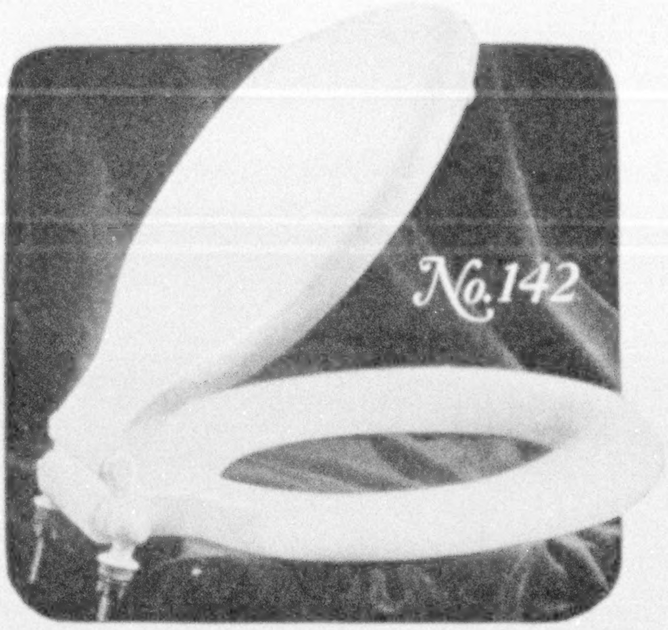

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ANY woman may well be proud to be able to offer her guests the use of a bathroom which contains a Church Sani-White Toilet Seat.

You find Church Seats in luxurious modern hotels and apartments. A luxury, yes, but priced low enough for the most modest cottage. You can easily put one on any toilet in a few minutes.

Its white surface is an ivorylike sheathing, as easy to keep clean as porcelain. It won't crack, split, wear off or change color. Phone or visit your neighborhood plumbing store today. They can supply you. Clip the coupon and mail for booklet and cross-section.

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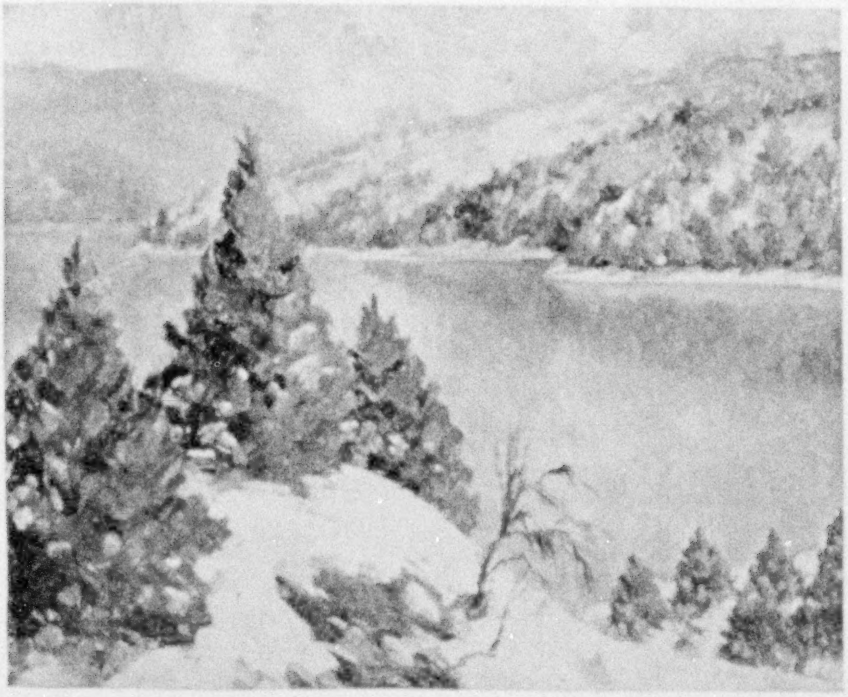

The Water Supply of a Metropolitan City

To give you a steady supply of clean water our reservoirs are guarded with infinite care.

Pure water from woodland springs and rivulets flows sparkling into the storage basins and eventually to your home. Fir trees planted around the watershed retain moisture and help to regulate the supply. Constant vigilance keeps it clean.

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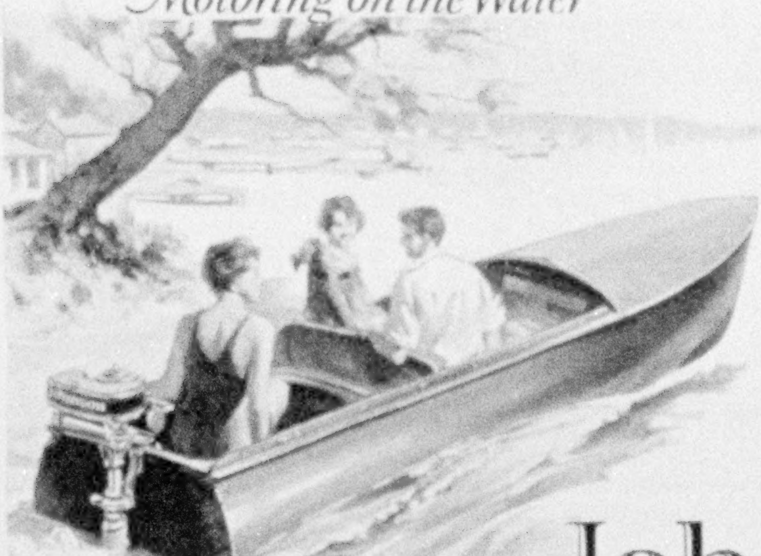

THIS summer—know the joy of motoring on the water. Go where you can follow any trail you might desire through shady inlet or clear rippling stream. There is no sport like water motoring. As you hear the call of distant shores you answer, knowing full well that your Johnson will get there and back swiftly and safely.

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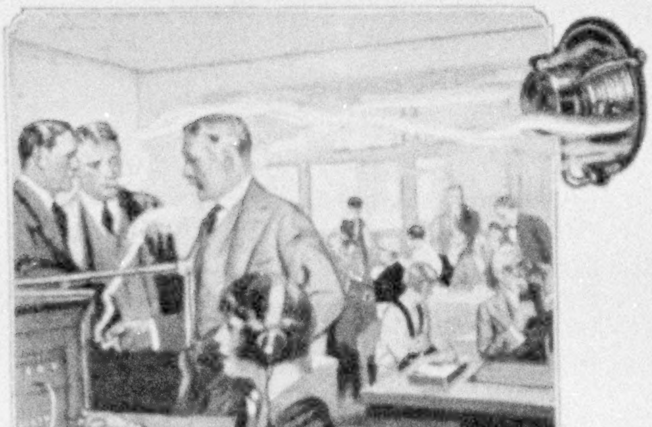

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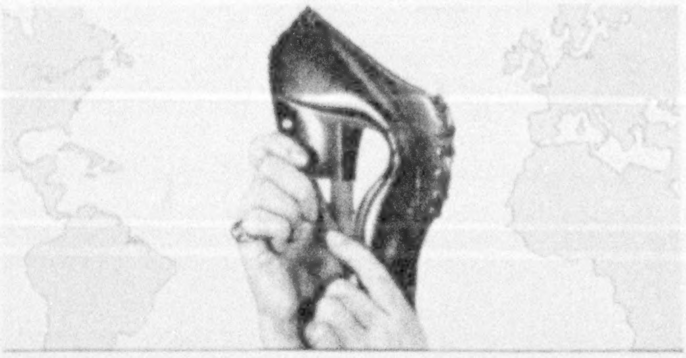
Food keeps BEST *in the*
HERRICK
THE ARISTOCRAT OF REFRIGERATORS



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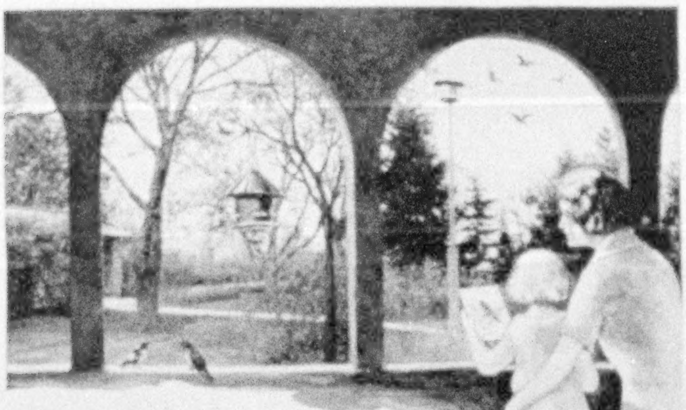

How Beautiful SONGBIRDS can be lured to your garden

Birds abide where they feel protection and know they can obtain food and drink without danger of being molested. Under such conditions they raise family after family, singing and working the whole day long, ridding the garden and trees of the injurious moths, weevils, worms, ants and mites that destroy your beautiful trees, shrubs and flowers. Invariably a Dodson house placed as directed will get these beautiful birds. The sweet-singing wren, bluebirds and flickers take naturally to Dodson's scientifically made houses. The beautiful cardinals, thrushes and dozens of other songbirds will seek your garden if the kind of shelter and food they like is provided. *Once you know the joy of bird friendship, you will regret the years of pleasure missed.*

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The happiest and most beloved songsters. Our scientific houses satisfy these most exacting birds. Made of oak, finished in green. Size, 21 inches high by 18 inches in diameter, with 18-foot easy raising pole. Price, $14.00.

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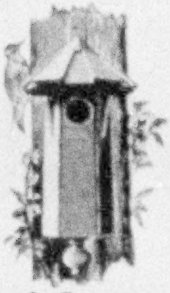

Lures the Flickers. They keep your trees free of destroying moths, ants and other tree pests. 26½ in. high by 12 in., only $7.00.

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Ask about Dodson's Guaranteed Sparrow Trap.

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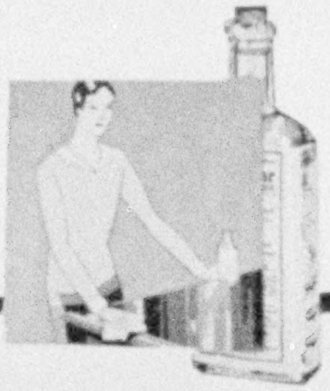

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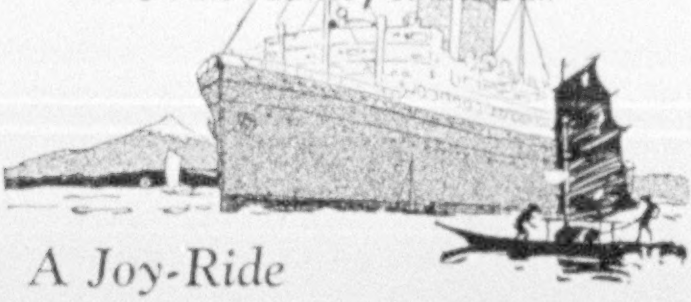

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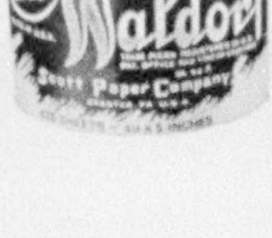

3 rolls 25c
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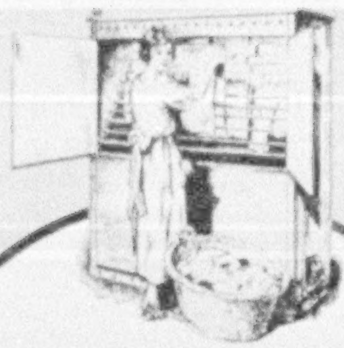

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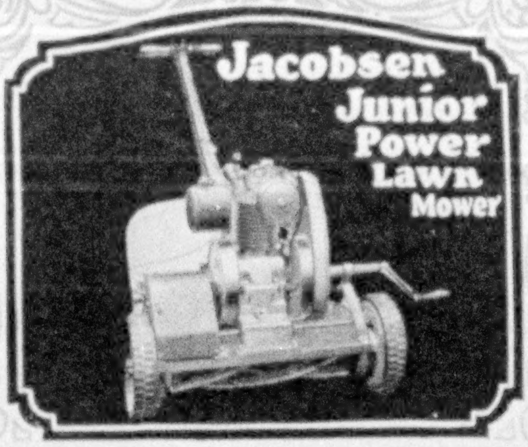

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for membership in the Society.

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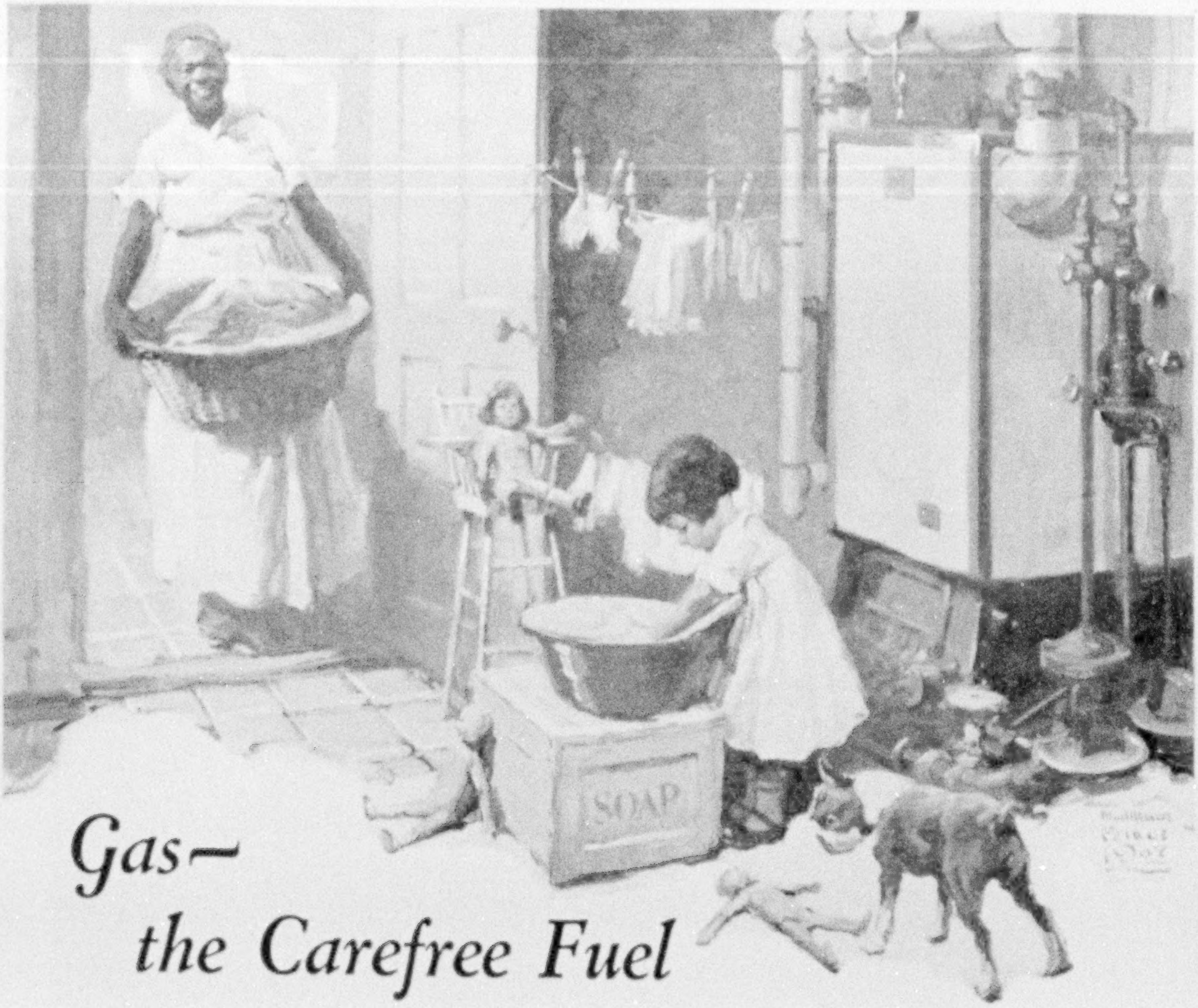
4-27 *Name and Address of Nominating Member*



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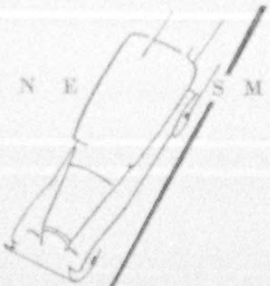
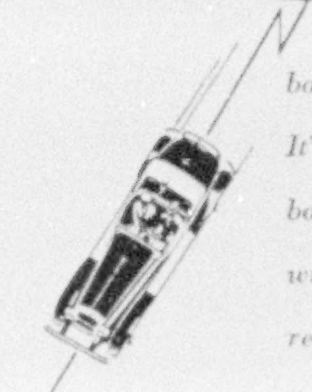


"They're half-a-mile back"

The little Marmon 8 is never challenged twice—by the same car — Even if you do get close, it will be only for a moment, because of its lightning-fast agility in any road congestion — No feeling of strain—only a clean sense of power,

backed by the knowledge that there is more to come, should it be called upon. It's a fine car made small. It is gallant on the boulevard and brave-hearted in bad places. It takes its distances effortlessly. It will park in a smaller space—and with less fuss — These are a few of the reasons why everybody's buying it.



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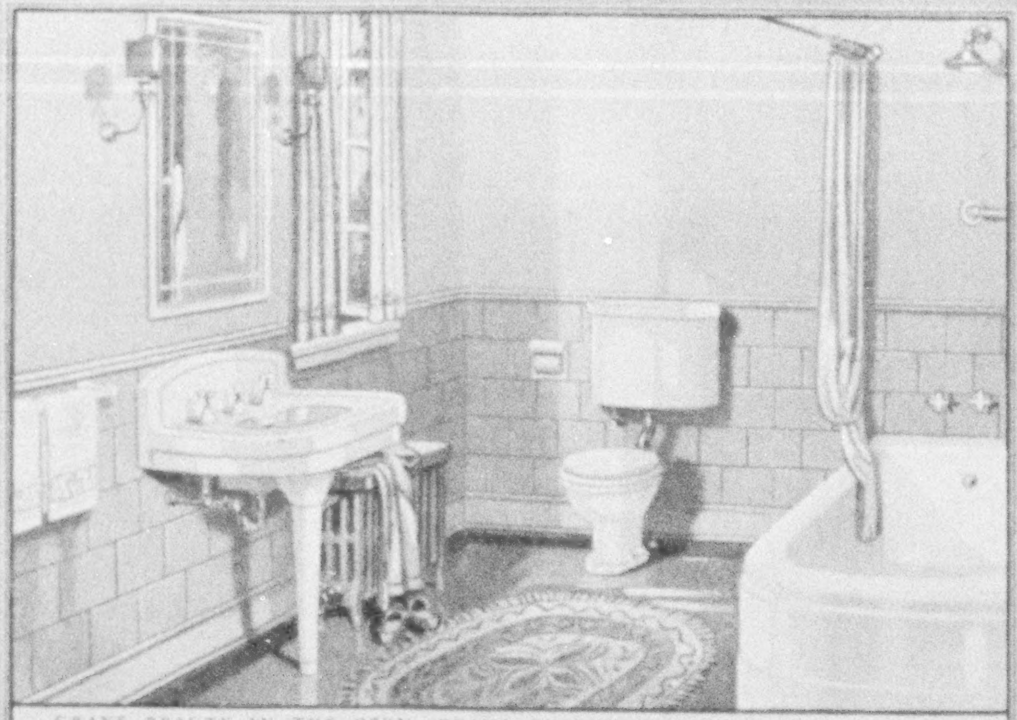

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